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Professional Paper 99

CHEMICAL ANALYSES OF IGNEOUS ROCKS

PUBLISHED FROM 1884 TO 1913, INCLUSIVE

WITH A

CRITICAL DISCUSSION OF THE CHARACTER
AND USE OF ANALYSES

A REVISION AND EXPANSION OF PROFESSIONAL PAPER 14

BY

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PREFACE.

The present paper is a revised and enlarged edition of Professional Paper 14,¹ published by the United States Geological Survey in 1903. In the 13 years that have elapsed since that paper was published there has been very noteworthy progress in the chemical analysis of igneous rocks. This progress is evident in the greatly increased number of analyses here tabulated, more than twice as many having been published between 1901 and 1913; inclusive, a period of 13 years, as were published between 1884 and 1900, inclusive, a period of 17 years. It is also evident in the improved quality of the analytical work, and one may venture to think that the publication of Professional Papers 14 and 28² encouraged and to some extent brought about this improvement.

The betterment in quality is manifested both in the greater proportion of more accurate analyses and the more frequent determination of the minor constituents; but even now our knowledge of the occurrence of the rarer elements in igneous rocks is sadly deficient for many countries in which the rock analysts, though doing active and accurate work, have failed to determine most of the minor constituents.

The present collection embraces the years from 1884 to 1913, both inclusive. With very few exceptions all the analyses published in Professional Paper 14 are reproduced here, for that paper is now out of print and may be inaccessible to many.

Further search of the literature has yielded a considerable number of additional analyses that were published within the time limits of the first collection but which were omitted from it. Several sets of analyses published prior to 1884 have also been included because they seemed to be of special importance or because they were not incorporated in Roth's Tabellen, covered by Professional Paper 28. Among these may be mentioned Hawes's analyses of the rocks of New England and New Jersey, and analyses of rocks of the West Indies and of Sumatra, published, respectively, by Cleve and Verbeek. Although the end of 1913 was fixed on as the final date to which the work should be brought, yet a number of analyses published

subsequently have been included. These embrace many which were contributed prior to publication by generous friends and which have appeared since, as well as a few which, for one or another reason, it seemed to be advisable to include. Professional Paper 14 embraced 2,881 analyses, and this paper embraces 8,602, including, as has been said, practically all those in Professional Paper 14 but not those from Roth's Tabellen, published in Professional Paper 28.

The collection is confined to analyses of igneous rocks, though it includes some analyses of orthogneisses. Dr. Paul Niggli, of the University of Leipzig, is engaged, I understand, in the compilation of the analyses of metamorphic rocks, a work which will be of great benefit to the student of these, for the most extensive collection of the analyses of these rocks so far available has been the selection published by Grubenmann.³ The analyses of meteorites have been recently collected by Farrington,⁴ who has classified the stony meteorites according to the quantitative system. He has also recently published⁵ a complete collection of descriptions and analyses of North American meteorites to January 1, 1909. In this connection may be mentioned the collection of analyses of meteorites and of some terrestrial peridotites published by Wadsworth.⁶

An aim kept constantly in mind has been to make the present collection as complete and accurate as possible and, in a sense, definitive. The search through the literature has therefore been very extensive, systematic, and thorough, the serial publications examined having extended from 1883 to the final date. Its extent may be gathered from the "List of publications examined," which is to be found on pages 38–44. In this search the extremely complete Library of the United States Geological Survey served as a basis and was examined very thoroughly. In this connection I take pleasure in expressing my thanks to Miss Julia L. V. McCord, librarian, and to the other officials of the library for their many courtesies and their friendly assistance. The libraries of Yale and Columbia Universities, of the Museum of Natural History in New York, and of the United States

¹ Washington, H. S., Chemical analyses of igneous rocks published from 1884 to 1900, with a critical discussion of the character and use of analyses: U. S. Geol. Survey Prof. Paper 14, 1903.

² Washington, H. S., The superior analyses of igneous rocks from Roth's Tabellen, 1869 to 1884, arranged according to the quantitative system of classification: U. S. Geol. Survey Prof. Paper 28, 1904.

³ Grubenmann, Ulrich, Die krystallinen Schiefer, Berlin, 1910.

⁴ Farrington, O. C., Field Columbian Mus. Pub. 120, 1907; Pub. 151, 1911

⁵ Idem, Nat. Acad. Sci. Mem., xiii, 1915.

⁶ Wadsworth, M. E., Lithological studies, Cambridge, Mass., 1884

National Museum have also been examined, to the officials of which I also extend my thanks.

I have also availed myself of Prof. A. Osann's valuable collections of analyses,¹ from which I have taken a number that had escaped my notice. The many analyses and the bibliography given by Iddings in volume 2 of his *Igneous Rocks* (1913) have also been collated. A collection of analyses of Swiss rocks from 1900 to 1915² reached me too late for collation with my collection. The same is true of a set of analyses of Queensland rocks.³ The authors of both were so kind as to send me many of the analyses prior to publication.

Through the kindness of F. W. Clarke, chief chemist, the records of the chemical laboratory of the United States Geological Survey were placed at my disposal, and the numerous analyses there recorded up to January 31, 1914, are included here. I would express my sincere appreciation of the courtesy of Mr. Clarke and the many geologists of the Survey, for whom the analyses were made, in thus making available, much of it prior to publication, a great amount of most valuable material.

It is also a pleasure to acknowledge my great indebtedness to many friends and fellow petrologists who have been so kind as to contribute analyses prior to publication and whose great generosity is deeply appreciated. Among these may be specially mentioned Prof. A. Lacroix; Dr. K. Inouye, director of the Geological Survey of Japan; Prof. U. Grubenmann, and the Geological Survey of Switzerland; Mr. J. J. H. Teall, ex-director, and Mr. A. Strahan, director of the Geological Survey of Great Britain; Mr. R. D. Brock, director, and other geologists of the Geological Survey of Canada; Drs. G. W. Card, W. N. Benson, J. W. E. David, H. C. Richards, and W. H. Twelvetrees, of the Australian Geological Surveys; Dr. P. G. Morgan, director of the New Zealand Geological Survey; and Drs. F. D. Adams, Florence Bascom, C. H. Clapp, H. P. Cushing, E. Gourdon, J. B. Harrison, J. P. Iddings, G. Kalb, J. F. Kemp, S. Kozu, G. P. Merrill, L. Milch, E. W. Morley, P. Niggli, P. Quensel, G. W. Tyrrell, and T. L. Watson. The many valuable analyses contributed by these and others have added much to the completeness of the present collection. A number of hitherto unpublished analyses made by me are also included.

Considerable changes, both additions and omissions have been made in the text. The additions consist in the incorporation of new matter and the expansion of the old. The omissions include considerable matter relative to the quantitative system, which is now so

well known that the discussions were considered needless. The section on the "Calculation of center points" has also been omitted. Greatly to my regret, the entire discussions of the distribution of magmas and the average rock have had to be omitted, as it was found to be quite impossible, with the time at my disposal, to work up the vast mass of data so as to arrive at a satisfactory and adequately complete treatment. Both of these topics are to form the subjects of separate publications.

In the tables the separate columns for CO₂ and BaO are omitted and one for the magmatic symbols in the quantitative classification is inserted. These symbols will be found very useful (more so than the systematic names), after a little experience with them, in giving a concise idea of the chemical character of a rock and its relations to others. These symbols are also used for the page headings, instead of the magmatic names used in Professional Paper 14.

All the norms of the analyses given in Professional Paper 14 have been recalculated. Indeed I have recalculated personally all published norms, to insure their uniformity and to verify or correct them. In this connection I would express my thanks to Dr. H. H. Robinson, who some years ago very kindly calculated for me many norms, which, however, were not used because I subsequently decided to calculate every norm myself. It can not be hoped that all analyses have been collected or all errors avoided in the present compilation. The list of errata on page 67 of Professional Paper No. 28 is sufficient evidence that such a hope is vain.⁴ My attention was called to several such errors, both of omission and commission, by friendly critics, and I trust that the same interest will be shown in regard to the present collection. I would also deeply appreciate the contribution of papers embodying further analytical data, especially inaugural dissertations and other difficultly accessible literature, for incorporation in supplements which it is hoped to issue in the future.

To my friends Whitman Cross and Joseph P. Iddings I am deeply indebted for much helpful criticism and advice, especially in the selection of the magmatic names. I must also express my thanks to Prof. M. Kawamura, of Kiushiu University, Japan, for his great assistance in reading much of the proof.

I would express my sense of deep obligation to Dr. Arthur L. Day, director of the Geophysical Laboratory of the Carnegie Institution of Washington, for his great liberality and kindness in allowing me to devote a very large part of my time during the last four years at this laboratory to the prosecution of the present work and in permitting its publication by the Geological

¹ Osann, A., *Beiträge zur chemischen Petrographie*; Teil 2, Stuttgart, 1905; Teil 3, (1), Leipzig, 1914.

² Grubenmann and Hézner, *Vierteljahrsh. Nf. Ges. Zur.*, LXI, pp. 150-203, 1916.

³ Richards, H. C., *Pr. R. Soc. Qld.*, XXVII, p. 105, 1916.

⁴ To eliminate one source of error every analysis in Part I has been compared by me or by Dr. Kawamura in the proof with the card on which it was collected, not with the manuscript.

Survey. Indeed, had it not been for the opportunity thus generously given, the completion of the work would have been impossible.

Finally, I would add a personal word of appreciation of the care and accuracy shown by the editorial staff of the Survey, and especially of the work of the compositors of the Government Printing Office in setting up this exceptionally difficult manuscript. Up to No. 140 of III. 5. 4. 4, page 656, a count was kept of the

errors in the figures, some of which were unquestionably my own in writing the manuscript. From the beginning of the tables to this point the proof sheets show only 79 errors in about 350,000 digits, and in the corresponding norms 47 errors in about 130,000 digits.

H. S. W.

GEOPHYSICAL LABORATORY,

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November 30, 1916.

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

By H. S. WASHINGTON.

THE IMPORTANCE OF ROCK ANALYSES.

In the first two or three decades of the nineteenth century, when the study of rocks as such was being differentiated from that of minerals and of rock terranes—that is, when the science of petrography was in its infancy, little attention was paid to their chemical features. It is true that a number had been analyzed, but most of these were of such a character as to lead the investigator of those early days to consider them minerals, as was the case with the first described lherzolite and wehrlite. In contradistinction to well-defined minerals, rocks were regarded as merely aggregates of minerals, occurring in presumably fortuitous combinations, and lacking that definiteness or constancy of composition in one mass or in different masses which would justify their chemical study as a whole. As, however, they became more and more the subjects of special research, beginning with the earliest investigations of Cordier,¹ a knowledge of their chemical composition assumed gradually increasing interest. The great importance of this side of the study of rocks was first clearly recognized by Abich,² who pointed out, as early as 1841, the necessity of a knowledge of their chemical composition for the solution of such problems as their origin, mode of formation, and connection with the interior of the earth, as well as the value of a comparison of their analyses as a proper basis for their classification and nomenclature. To him, therefore, is due the credit of introducing the chemical composition of rocks as a basis for their classification; though the good influence of this suggestion for their right understanding was largely nullified by the coincident use of the feldspars alone as one of the main factors of classification,³ an idea which has had a deplorably retarding influence on the development of systematic petrography for many years, and which even now holds many systematists firmly in its grasp.

For about 30 years after Abich's publication chemical analyses occupied a prominent position in petrographical discussions, being employed largely for the purpose of determining the probable mineral composition of rocks. Abich, in the work just cited, had adopted as a means to this end the ratio of the oxygen

of the bases to that of the silica, and was thus enabled to calculate approximately their mineral composition, as Rammelsberg and others did later.

A modification of this method, known as the "Oxygen-ratio" (Sauerstoffquotient), was introduced by Bischof,⁴ and was long employed for the correlation of rock analyses and for the investigation of the question whether or not the various oxides were present in rocks in stoichiometric proportions. This ratio for any given rock is obtained by dividing the amount of the oxygen in all the bases by that in the silica, and was supposed to be characteristic of different broad groups. This supposition was eventually found to be unwarranted, as rocks of very diverse chemical or mineralogical characters were shown to have the same or similar oxygen-ratios. It is noteworthy that, although Roth himself pointed out this and other grave objections to the use of this ratio,⁵ he gives it in connection with the separate analyses in all his tables—even in the last one, published in 1884. He justifies this by saying⁶ that it is done "only in the absence of a better means of comparison, as well as to make it possible to compare the older and newer analyses."

It was also shown by Roth and others that rocks could not be referred to simple chemical formulæ; in other words, that the oxides were not present in stoichiometric proportions. This, indeed, is one of the most important results arrived at by Roth from his study of the analyses collected by him and first published in 1861.

Soon after Bischof's suggestion of an oxygen ratio there appeared⁷ Bunsen's well-known hypothesis of the formation of igneous rocks by the mixture of two supposed original magmas—the "normal trachytic" and the "normal pyroxenic."⁸ For the application or the discussion of this hypothesis, analyses were, of course, all important. Founded, as the hypothesis was, on insufficient data, it had to yield to the evidence furnished by the many analyses to which it gave rise.

With the abandonment of this view of the genesis of igneous rocks, and because of the coincident intro-

⁴ Bischof, G., *Lehrb. chemischen und physikalischen Geologie*, vol. 2, p. 631, 1849.

⁵ Roth, J., *Gesteins-Analysen*, Berlin, p. 10, 1861.

⁶ Roth, J., *Beiträge Petrographie pluton. Gesteine*, p. 87, 1869.

⁷ Bunsen, R., *Pogg. Ann.*, vol. 83, p. 197, 1851.

⁸ These terms are ill-chosen because of their incongruity. It would be more fitting to contrast "basaltic" with "trachytic," or else "feldspathic" with "pyroxenic."

¹ Cf. Cross, Whitman, *Jour. Geology*, vol. 5, p. 352, 1902.

² Abich, H., *Natur der vulkanische Bildungen*, p. 5, Braunschweig, 1841.

³ Cross, Whitman, *op. cit.*, p. 362.

duction of the microscope in the early seventies, analyses lost much of their importance. Though they were still published, it is evident that they were, as a rule, inserted perfunctorily in petrographical writings, in obedience to custom, as ornamental embellishments. Little or no stress was laid on them, and the efforts of the petrographer were devoted chiefly to the elucidation of the purely mineralogical and textural characters of the rocks described.

The microscope poured a flood of light upon the mineralogical composition as well as on the texture of rocks and rendered easy and certain of attainment results which by the older methods, based on analysis, had been attained only with difficulty or not at all. At the same time the collapse of Bunsen's hypothesis left for the time being no general theory of rock formation and genesis in its place, Durocher's liquation hypothesis¹ and Roth's first suggestion of differentiation² attracting little attention. Petrographers were too busy collecting and assimilating the vast mass of facts discovered through the microscope to be able to devote much of their energies to theoretical studies.

With the opening of the last decade of the nineteenth century, however, there arose an interest in theoretical petrology in contradistinction to descriptive petrography, which had prevailed since 1870. This was started by the work of Lagorio, Teall, Rosenbusch, Brögger, Iddings, and others, and since that time analyses have occupied a more and more prominent place in petrological discussions. They are no longer ornamental adjuncts, but essential parts of most petrographical publications, on which much of the discussion hangs, and from which the most important conclusions are drawn. The crystallographic and optical properties of the constituent minerals and the details of texture are no longer the main subjects of investigation, but are finding their place with the chemistry of rocks and the broad and far-reaching physico-chemical studies based on this. The microscope is sharing the throne with the balance.

It is coming to be recognized by petrologists in general that the study of igneous rocks is in large part the study of silicate solutions and their equilibria, often complicated by the presence of volatile components, and is thus to be regarded as essentially a special branch of physical chemistry. It is true that some of the conditions under which they are formed in nature are not yet reproducible with the present laboratory facilities and that the solutions involved are of great complexity, but these difficulties may be and are gradually being overcome, so that it would seem that the study of rocks is now being placed on its proper and sure basis. For this rock analyses are all-important—indeed, indispensable.

THE CHARACTER OF ROCK ANALYSES.

GENERAL CONSIDERATIONS.

With the growing interest in rock analyses it is of the utmost importance that they be used intelligently, not only in their application to theoretical discussions, but, which is of especial interest here, with a just appreciation of their character and applicability to the purpose in view. It is a somewhat surprising and, it must be said, a rather saddening fact that the critical judgment of petrographers in general as regards rock analyses often seems to be in abeyance or wholly lacking. Though there has been in recent years a marked improvement in this respect, yet there is still among them now, as there seems always to have been, a tendency to place implicit confidence in the results of analytical work—to accept readily whatever figures the analyst may furnish, with seldom an attempt at a critical estimate of the worth of the analysis or a comparison of it with the chemical character of the rock itself as revealed by microscopic study. It seems to be taken for granted by most petrographers that the analyst, like the proverbial king, can do no wrong. This assumption applies, of course, not to the personal good faith of the analyst, but to the analytical processes, which, possibly because they belong to one of the exact sciences, are for the most part tacitly assumed by the petrographer to be infallible. It is noteworthy that this attitude of mind obtains, not only among beginners, but among the foremost workers in the science. There are, it is true, many examples of the application of expressed criteria in the selection of analyses in well-known papers, especially in recent years, but in all these examples the criteria applied are few and quite inadequate to the purpose, being confined, for the most part, to the freshness of the rock. Comparatively few petrographers seem to recognize the difficulties and uncertainties of analytical work or to display any practical acquaintance with its methods.

It goes without saying that this way of regarding analyses is totally at variance with the best interests of the science. Analyses constitute the basis of much of the investigations and discussions with which petrographers and petrologists must occupy themselves, and it is surely not the part of wisdom to erect elaborate structures on foundations of whose stability and careful workmanship one is not assured. Time and labor will be saved in the end, and the superstructure, however well built in itself, will have a far better chance of withstanding the ravages of time and the attacks of critics if all the rotten and unsound blocks in its foundation are removed and only the best and strongest material is retained.

A consequence of this unquestioning confidence in the results of analytical work is that it is frequently

¹ Durocher, J., *Ann. des Mines*, vol. 11, p. 217, 1857.

² Roth, J., *Gesteins-Analysen*, p. xlix, 1861.

intrusted to a student in chemistry, one with little or no experience in the analysis of rocks and with no appreciation of the complexities and difficulties inherent in this department of quantitative analysis. That the results furnished by such inexperienced and to this extent incompetent analysts should be received with the greatest caution is a truism to anyone acquainted by actual experience with the difficulties and complexities of rock analysis. But Hillebrand¹ and Pirsson² have expressed so clearly and concisely the views which I hold that I can do no better than refer to them. It is certainly remarkable and significant that in petrography the most difficult and intricate work is intrusted to novices, and that their results are accepted by nearly all with the same confidence that is given to the work of an experienced analyst.

This general laxity among petrographers as regards the quality of rock analyses is only too painfully evident in the present collection. There is an astonishingly large proportion of poor work, much of it of such a character that it would seem that even a tyro would reject the analyses as hopelessly inadequate for use. Analyses are given with summations over 105 or below 96. Some analyses of leucite-basanite show alkalies so low that 10 or more per cent of quartz must be present, even though in the calculation all the potash is assigned to orthoclase and all the soda to albite. Some analyses of rocks rich in olivine show 30 per cent of alumina and only small amounts of ferrous oxide and magnesia. In certain analyses of alkalic rocks the alkalies have not been separately determined. Rocks with abundant aegirite contain no ferric oxide, and some with sodalite contain no chlorine, to judge from the figures furnished.

Lagorio's long, elaborate, and classical discussion of rock magmas and the relations of phenocrysts and groundmass is based on numerous analyses, of which scarcely any have been judged by me to be of "superior" quality, so that very few of them appear in Part I of these tables. Vogt's well-known discussion of eutectics centers largely around five analyses of graphic granites in which only five constituents are determined and which must be relegated to the inferior analyses of these tables.

The chief reason for this low standard of criticism on the part of petrographers as regards analysts and analyses would seem to be that, while all of them are necessarily conversant with chemistry from the theoretical side, few have knowledge of the theory of quantitative analysis or experience in its methods. The fact is not generally recognized that the complete and adequate analysis of an igneous rock is one of the most complex and in some respects one of the difficult problems of analytical science, demanding not

only chemical knowledge and manipulative skill, but often the exercise of considerable judgment derived from experience in solving the perplexing problems which may present themselves.³

In view of the present greatly increased importance of chemical analyses in petrography, it can justly be insisted that the ability to make an accurate and complete chemical analysis of an igneous rock should form an essential part of the training and equipment of every petrographer, for by such knowledge one can best judge the true value of an analysis, see where errors have possibly crept in, and discriminate between what is good and worthy of use and what is bad and to be rejected.

In view of this state of affairs it will be pertinent to discuss at some length the essentials of a good analysis, the theoretical and practical criteria by which analyses may be judged, and, in a rough way, to estimate the weight which may be given to any analysis in theoretical discussions.

REPRESENTATIVENESS.

CHARACTER OF THE ROCK MASS.

An analysis of an igneous rock is of value in direct ratio as it fulfills three conditions—that the specimen analyzed is representative of the rock mass, and that the analysis itself is accurate and complete in its determination of the constituents present. We may consider these three factors in the order stated.

The representative character of the specimen depends partly on the character of the rock mass and partly on the amount of material taken. If the mass is uniform or if a single uniform facies is the object of investigation two courses of procedure are possible. A single representative specimen from one locality may be selected for analysis, or pieces of several specimens collected from different parts of the mass may be taken, pulverized, and mixed, and the analysis made of this mixture. The course last described labors under the disadvantages that the analysis can not be checked by analyses made by others, and that uncertainty will always exist whether the mixture of several specimens really represents the composition of the whole better than does a single specimen.

Generally it is by far the best plan to select a definite locality, preferably one that can be identified later and that is not likely to become inaccessible through building or other operations, the rock from which can be considered representative of the whole mass, and make the analysis of a specimen from this.

If there should be doubt as to the general uniformity of the whole mass, it is better to take samples from different parts, even if this procedure should involve considerably more analytical work, for a much more detailed knowledge will thus be gained, and

¹ Hillebrand, W. F., U. S. Geol. Survey Bull. 148, p. 16, 1897.

² Pirsson, L. V., U. S. Geol. Survey Twentieth Ann. Rept., pt. 3, p. 578, 1900.

³ Cf. Hillebrand, W. F., *op. cit.*, p. 16.

important features which may otherwise be overlooked may be rendered evident.

In making analyses of a heterogeneous mass, such as a stock or dike with marginal facies, it is likewise always the wisest plan to have separate analyses made of the different facies, even if the determination of the character of the mass as a whole is the only object in view.

The decision as to the representative character of the specimen selected must be left to the collector, and it would seem natural that a petrographer who had the analysis of a rock in view and who thought its analysis might be of value would carefully consider this question in the field and select his material accordingly. The evidence is conclusive, however, that many specimens analyzed have been collected with no reference to this point, a fact that has greatly diminished the value of the analytical work afterward expended on them.

In connection with this subject the question naturally arises whether rock masses are indeed so uniform in character that any single specimen will truly represent the whole, and whether specimens from different parts of an apparently uniform mass, even if taken close together, may not differ widely in composition. A full treatment of this fundamentally important topic is impossible here, but the outcome of such a discussion would be that, though differences may be found in modally or normatively (but not texturally) eutaxitic or schlieric masses, yet a rock mass which is megascopically and microscopically uniform will generally furnish specimens that, if examined by two or more competent analysts and by reliable methods, will yield results that are practically identical. In other words, in the terms of the new classification, they would fall in the same subrang, or very close to the same border lines.

No investigation appears to have been made especially to decide this point, but the present collection furnishes a number of examples that sustain the conclusion just stated. Among them may be mentioned the analyses of the Butte quartz monzonite, (No. 5, I. 4. 3. 3 and Nos. 6, 7, 8, II. 4. 3. 3), the phonolite of the Black Hills (Nos. 10 and 11, I. 6. 1. 4), the essexite of Salem Neck (Nos. 4 and 5, II. 6. 2. 4), the keratophyre of Marblehead Neck (Nos. 20 and 21, I. 4. 1. 3), the leucite banakite of the Yellowstone Park (Nos. 10 and 11, II. 5. 3. 3), and the Quincy granite (Nos. 28 and 29, I. 4. 1. 3).

The specimens should, of course, be taken from fresh, unaltered rock, for only such specimens represent the chemical character of the magma. In some places, however, absolutely fresh material is not to be had; but if there is more than a very slight degree of alteration an elaborate analysis is not necessary. We can hope to obtain from an analysis of such a rock but a general idea of its magmatic character, and, though the

main constituents should be determined with accuracy, it will scarcely be worth while to determine the minor constituents except for special purposes, as for the study of rock weathering. If the alteration is slight the proportions of the main oxides will not be much changed, but those of the minor oxides will be relatively much more so.

AMOUNT OF MATERIAL.

The amount of material that will adequately represent the rock mass is a matter that deserves the careful consideration of the petrographer and the analyst. For actual analysis at least 10 grams of pulverized rock should be available, but, in view of the possibility of the redetermination of some or all of the constituents or the determination of some for which large portions are needed, it is well to have 20 or 30 grams.¹ No definite rule can be laid down as to the amount that should be taken, which depends on the granularity of the rock and whether it be porphyritic or not. For an analysis of fine or medium-grained, aphanitic or glassy rocks, which are not porphyritic or are only finely so, a few chips, amounting to 30 or 40 grams, will be quite sufficient. Of coarse-grained rocks, or those that are coarsely porphyritic, much more will be needed, the amount being dependent on the coarseness of the grain. For nearly all ordinarily coarse-grained rocks, or those in which the phenocrysts are less than an inch in diameter, an ordinary small hand specimen, or even a smaller fragment, will be quite sufficient, the size being determined by the judgment of the petrographer. If the rock is abnormally coarse, as are some pegmatites and nephelitic syenites, much more must be taken, perhaps several pounds. At a few places a large rock surface must be measured to determine the relative amounts of the various minerals, and proportionate amounts of these must be taken and mixed for analysis. This last condition, fortunately, is of rare occurrence, and an analysis made of such material must be regarded as only approximate at best.

If more than 50' grams or so of material is used it is not necessary to pulverize the whole, for a sample may be obtained by making successive crushings and quartering, as in assay work. Care must be taken to do this properly and systematically, according to methods described in any work on assaying.

It should be noted that the whole of the small amount of chips or sample obtained by quartering must be pulverized and used for analysis. The rock-making minerals differ so greatly in brittleness that if only a portion of the sample be pulverized it will not represent the true average composition, for the more brittle minerals, such as quartz and the feldspars, will be reduced to powder first, while the tougher ones, as hornblende, pyroxene, and mica, will

¹ Cf. Hillebrand, W. F., U. S. Geol. Survey Bull. 148, p. 23, 1897.

need more crushing and grinding. If, therefore, the last portions, which do not pass easily through the silk sieve, are rejected, the analysis will show a slightly more salic composition than exists in fact.

On the other hand, owing to the same fact, the fine dust lost during the operations of crushing, sifting, and grinding will be composed chiefly of salic minerals, so that, strictly speaking, all rock analyses show a somewhat more femic composition than they should, though the error must be very slight.¹

MICROSCOPICAL EXAMINATION.

A microscopical examination of the rock in thin section should always precede the chemical analysis. This examination will not only reveal clearly the general composition and freshness of the rock, but may indicate its minor constituents, such as zirconia, sulphur trioxide, and chlorine.

The petrographer can thus indicate to the analyst the minor constituents to be estimated and those for which it is not worth while to look. Some of the main analytical processes may also be modified and shortened by a knowledge of the general character of the rock. Useless labor may thus be saved to the careful and thorough but nonpetrographical analyst, who, in the absence of such indications and in the conscientious endeavor to have his analysis complete, may spend much time looking for constituents that are absent, or present in only insignificant amounts.

ACCURACY.

DETERMINING FACTORS.

Assuming that the sample analyzed is representative of the rock mass, the degree of correspondence between the figures yielded by the analysis and the true composition of the rock is dependent on two factors—the accuracy of the analysis and the degree of its completeness.

By accuracy is meant the degree of precision with which the constituents sought for have been determined, quite apart from the fact whether all those present have or have not been determined or separated one from another. The accuracy of an analysis, which may be discussed apart from its completeness, depends on the personal ability of the analyst to make analysis, on the reliability and adequacy of the methods employed, and on the quality of the reagents and apparatus used.

The factor of the analyst has already been touched on in speaking of the practice of intrusting rock analyses to students, and the obvious truth that

the personal factor is a most important one in the making of analyses need only be stated here. Thus the work of a trained and experienced chemist will presumably be of far higher character than that of a beginner publishing his first analysis in an inaugural dissertation or that of a student in chemistry to whom the analysis of a rock has been given for practice. It is true that the man of experience may not be a good analyst, or that he may be hampered by bad methods or poor reagents, and, conversely, the work of the beginner may be, and often is, of very good quality; but the fact remains that the work of the tyro will not carry the weight of that of the expert in the absence of confirmation of its character by other evidence.

The employment of reliable and accurate methods is of course essential to good analytical work. As this paper, however, is not intended to be a treatise on the analysis of rocks, the matter can be only briefly touched on for the especial purpose of pointing out to the nonanalytical petrographer some of the more common pitfalls that beset the path of him who undertakes the analysis of rocks.

In view of the wide experience of the chemists of the United States Geological Survey, and the uniformly high standard of excellence shown by their work, it may be recommended that the methods adopted by them² should be employed whenever possible, at least until improvements on them, or better methods, shall have been devised. Too high commendation can hardly be bestowed on their analyses, especially the later ones, which stand in a class apart from almost all others, as a study of the material here collected will render evident.

POSSIBLE ERRORS.

The fact must not be lost sight of by petrographers unacquainted with quantitative analysis that in certain portions of the processes there is liability to serious error, due either to inherent defects in the method or to the necessity for special care in manipulation, such care as can be exercised only by a careful and experienced analyst. The most prominent of these sources of error will be briefly stated.

Liability to error attends the determination not only of the minor constituents, which is generally of comparatively small moment, but unfortunately that of most of the main and important chemical constituents, where it becomes a matter of great importance. The determinations which will be discussed are those of silica, alumina, ferric and ferrous oxides, magnesia, lime, soda, potash, titanium dioxide, phosphorus pentoxide, and manganous oxide.

¹ The only instance known to me where this has been especially investigated is that in S. Zaleski's study of the amount of quartz in granites (Tschermak's Mineral. Mittheil., vol. 14, p. 350, 1895). He shows by determinations of silica that the dust produced in the pulverization of granites is notably richer in feldspar relatively to quartz and dark minerals than the coarser portion of the powder.

² Cf. Hillebrand, W. F., U. S. Geol. Survey Bull. 422, 1910; and Washington, H. S., The chemical analysis of rocks, New York, 1910.

In regard to silica, Hillebrand,¹ has clearly shown that the methods usually employed do not yield accurate results, but that two or more evaporations, alternating with filtrations, together with prolonged ignition over the blast, are advisable. He also shows that silica is not wholly thrown down by ammonia or sodium acetate along with the aluminum and iron, and that it is appreciably soluble in melted potassium pyrosulphate. But assuming that the silica has been corrected for impurities by evaporation with hydrofluoric acid, as must always be done, it may be said that these errors incident to its determination are in general of small magnitude and do not seriously affect the value of the analysis, especially as this constituent is almost invariably present in greatest amount.

Alumina is, of all the constituents, the one most liable to serious error, the general tendency being almost uniformly toward too high figures. This tendency arises in part from the fact that alumina is determined by difference, so that the nondetermination of certain constituents raises its apparent amount.

Increase in the apparent amount of alumina, due to imperfect separation of magnesia, is probably the error of considerable magnitude most commonly met with in rock analyses, especially in those of the more femic (basic) rocks. It arises from the fact that magnesium hydroxide tends to fall down with aluminum hydroxide on precipitation with ammonia. This can be prevented only by the presence of sufficient ammonium salts and by repeated precipitations, either with ammonia alone or with sodium acetate as well. These conditions are easily neglected by the inexperienced analyst, and in compiling the present collection so many analyses have been noted where this error has certainly been made, and so many others where it is strongly suspected but not definitely provable, owing to the insufficiency of the petrographic description, that I must add my word of warning to those of Hillebrand² and Pirsson.³

Another error, probably of very frequent occurrence but of less magnitude, and hence less readily detectable, is that due to the use of ammonia water which is not fresh and which has absorbed carbon dioxide from the atmosphere. A certain, though generally a small, amount of lime will then be precipitated along with the alumina and weighed with it.

A third error, which may be of very considerable magnitude, arises from the use of ammonia water that has been kept in uncoated glass bottles. The glass is invariably decomposed and the ammonia water becomes contaminated with impurities, chiefly silica, which add to the apparent weight of the alumina of the rock. This error can readily be avoided by

purchasing the reagent in ceresine bottles and, as the ceresine stoppers are not usually effective in excluding carbon dioxide, by transferring it to a glass-stoppered bottle that has been coated internally with paraffine. For the same reason it is also well, in the most accurate work, to make the ammonia precipitations in a gold or platinum basin.

In regard to the determination of ferrous oxide, Stokes⁴ has shown that ferric sulphate exerts a marked oxidizing effect on pyrite, and, starting from this fact, Hillebrand⁵ demonstrates the unreliability of the Mitscherlich method, commonly employed in Europe for the determination of ferrous oxide—that is, decomposition with sulphuric acid in a sealed tube. It should also be noted that the glass of the tube is likely to be seriously attacked. This method often gives, especially in rocks rich in iron, too high results for ferrous oxide. Decomposition by hydrofluoric acid in an atmosphere of carbonic acid is to be preferred, which, however, in the hands of inexperienced analysts, is liable to give low figures for ferrous and correspondingly high figures for ferric oxide, in consequence of the partial oxidation of the ferrous oxide due to careless manipulation. These errors undoubtedly explain a number of anomalous figures for ferrous oxide found in the present collection, for these figures do not accord with the mineralogical composition shown by the descriptions.

The error involved in the determination of ferrous oxide through its oxidation in grinding⁶ should also be considered. Though possibly of importance, especially in rocks high in ferrous oxide, if the grinding is prolonged and the powder is very fine, I believe that it has been exaggerated and that it is negligible if the portion of rock powder taken for the determination of ferrous oxide be that used for the main analysis, without further grinding than that involved in preparing the sample for analysis—a matter of a few minutes' grinding after crushing.⁷

Another possible error in the determination of the iron oxides, one that may be easily made by the novice, is that which is involved in the reduction of the solution of the precipitate by ammonia water for determining the total iron. If the current of hydrogen sulphide or sulphur dioxide is not continued for a sufficient length of time, the ferric sulphate will not be completely reduced to the ferrous state, so that the apparent amount of ferric oxide will be too low and that of alumina correspondingly too high. This will not, of course, affect the ferrous oxide, as this is always determined in a separate portion. If zinc is used for

¹ Stokes, H. N., U. S. Geol. Survey Bull. 186, 1901.

² U. S. Geol. Survey Bull. 422, p. 157, 1910.

³ Mauzelius, R., Sver. geol. Und., Årsbok I, No. 3, 1907. Hillebrand, W. F., U. S. Geol. Survey Bull. 422, p. 154, 1910. Washington, H. S., Chemical analysis of rocks, p. 135, 1910.

⁴ Cf. Washington, H. S., Chemical analysis of rocks, p. 135, 1910. In this opinion Dr. J. C. Hostetter, of the Geophysical Laboratory, is in accord with me.

¹ U. S. Geol. Survey Bull. 422, p. 91, 1910, and Jour. Am. Chem. Soc., vol. 24, pp. 362 et seq., 1902.

² Hillebrand, W. F., U. S. Geol. Survey Bull. 170, p. 55, 1900.

³ Pirsson, L. V., Jour. Geology., vol. 4, p. 688, 1896.

the reduction of iron, titanium dioxide will also be reduced to sesquioxide, which will be titrated with potassium permanganate, and will add to the apparent amount of ferric oxide.

The source of error in the determination of lime due to the presence of calcium carbonate in the ammonia water has been mentioned in connection with alumina on the preceding page.

The error involved in the liability of the magnesia to be precipitated in part with the alumina, which has already been noted, will lead to figures that are too low for this constituent.

Another error in the determination of magnesia, though in general of less magnitude and importance, is that involved in its precipitation as ammonium magnesium phosphate: Under the conditions usually obtaining in this determination there is a tendency toward errors that apparently increase the amount of magnesia, owing to the presence of excess of the precipitant, ammonium salts and free ammonia. Since this error is due to the fact that, under these conditions, the ammonium magnesium phosphate contains more phosphorus pentoxide than is called for by the ideal constitution, it will not affect other constituents but will be positive in its effect, and will thus raise the summation of the whole analysis. This error will usually be small, and even if the analyst is not expert will be of less magnitude than that involved in precipitation of magnesia with alumina.

In regard to the determination of the alkalis, I need only add a word in confirmation of the view expressed by Hillebrand as to the advantages of the Lawrence Smith method, both as to accuracy and as to time saved. The slight correction necessary for the minute amount of alkalis in the calcium carbonate used is constant and is easily and safely applied; whereas the other methods of decomposition, involving the preliminary separation of alumina, iron oxides, lime, and magnesia introduce a large element of uncertainty and possible error, owing to the impurities contained in the reagents or taken up from the glass vessels.

The colorimetric method for the determination of titanium dioxide is by far the most accurate and the quickest, and should be uniformly used, for the older methods, based on its precipitation by prolonged boiling, are very uncertain unless the conditions are very exactly adjusted, especially when much titanium dioxide is present, in which case it is very liable to be contaminated by alumina and ferric oxide. The assumption which is sometimes made, that the residue left on evaporation of the silica with hydrofluoric acid represents all the titanium dioxide present, is quite unwarranted, for this residue contains only part of it, and also some alumina, ferric oxide, and phosphorus pentoxide.

Because of the likelihood of error involved in the use of the acetate method, as well as the far greater expeditiousness of the colorimetric method, manganese should always be estimated in a separate portion by the latter.

COMPLETENESS.

CONSTITUENTS TO BE DETERMINED.

The ideal analysis should show the percentage of every constituent of the rock, and, for practical purposes at any rate, all those that it contains in amount sufficient to make their determination a matter of interest or whose presence or absence bears on the problem for which the analysis is made.

The amount which may make a constituent worth determining and the number of constituents to be sought will vary, of course, for different rocks. Thus for rocks as simple as most granites, rhyolites, and anorthosites it is not necessary to determine so many constituents as should be determined in nephelite syenites and rocks belonging to the dosalane and saffemane classes. But as an analysis should truly represent the composition of the rocks, as it may, if complete, be of use to others for the discussion of problems other than the one immediately in hand, and as only good work should be countenanced in science, every analysis should be as complete as it is practicable to make it.

MAIN CONSTITUENTS.

In every rock analysis worthy of the name all the main constituents must be determined. These include silica, alumina, ferric and ferrous oxides, magnesia, lime, soda, potash, and water.

Unfortunately, in many analyses the iron oxides have not been separately determined but are given together as either Fe_2O_3 or FeO or equivocally bracketed opposite both of these. Unless the iron oxides are present in very small amount—for example, less than 1 per cent—or unless the presence of a considerable amount of pyrite or pyrrhotite makes the determination of ferrous oxide very uncertain, this is unjustifiable, as the proper separate determination of these two is essential to the complete chemical discussion of the rock magma and the calculation of the mineral composition, either normative or modal. This fault and the error involved in the separation of alumina and magnesia are the most common defects in rock analyses, and a surprisingly large number have been rejected from Part I of the tables on their account.

The alkalis are occasionally estimated together (as Na_2O) or determined by the difference from 100 per cent. This procedure is followed especially in analyses of the more femic rocks, but sometimes in analyses of rocks in which the alkalis amount to several per cent. For this form of slovenliness there should be no excuse, except in analyses of rocks composed largely or

entirely of such minerals as olivine, magnetite, and ilmenite, in which the alkalis can be present only in traces at most.

The molecular weights of orthoclase and albite are so high¹ that in any chemicominalogical system of classification, or in the calculation of the mode, the determination of both of these oxides is of great importance. Furthermore, the assumption is made that the sum of the analysis will be exactly 100 per cent—an assumption quite unwarranted in view of the great rarity of this occurrence, especially when the chemist thinks so little of his work as to be unwilling to determine the alkalis properly.

In some analyses of highly salic or highly alkalie rocks magnesia and lime are not determined but are given as "traces." In most of these analyses their nondetermination will not seriously affect the results of calculation, but it is to be deplored; it shows that the work was not first class. In the statement of an analysis the term "trace" should indicate strictly and uniformly that the constituent has been looked for and found, though in negligible amount (0.1 milligram or less), but if it is not looked for because it is supposed to be present in small amount, some such phrase as "present, not determined" (p., n., d., not det., or undet.) may be employed. The limits assigned to the term "trace" vary widely, and the present collection includes analyses in which this term is used of constituents that are certainly present to the extent of 1 or 2 per cent or more. This applies especially to titanium dioxide.

MINOR CONSTITUENTS.

Assuming that the nine main constituents are determined, we may now consider those usually regarded as "minor." Both Clarke² and Hillebrand³ lay stress upon the importance of their determination for the solution of some broad petrological problems. Thus the work of the chemists of the United States Geological Survey has demonstrated the comparative abundance and general distribution of titanium, barium, and strontium, and a greater abundance of barium along the Rocky Mountain region than in the eastern and the extreme western parts of the United States. The presence of vanadium in many of the more femic (basic) rocks and of molybdenum in the more quaric (siliceous) rocks,⁴ of zirconium in presodic and especially nephelite-bearing rocks, and of nickel and chromium in very femic rocks has been discovered by means of complete analyses. The correlative distribution of the minor elements has been discussed elsewhere.⁵

¹ One per cent of K_2O corresponds to 6 per cent of orthoclase, and the same amount of Na_2O to 8 per cent of albite.

² Clarke, F. W., U. S. Geol. Survey Bull. 591, p. 17, 1915.

³ Hillebrand, W. F., Jour. Am. Chem. Soc., vol. 16, p. 90, 1894. U. S. Geol. Survey Bull. 422, p. 18, 1910.

⁴ Hillebrand, W. F., Am. Jour. Sci., vol. 6, p. 216, 1898.

⁵ Washington, H. S., Am. Inst. Min. Eng. Trans., p. 735, 1908.

Indeed, Hillebrand has entered so strong a plea for completeness in rock analysis that little more need be said to convince petrographers of the correctness of his position. Since, however, there is a strong tendency to regard as adequate for petrographic purposes analyses in which only the nine main constituents have been determined, further remarks, especially in elucidation of some special points, may not be amiss.

It is obvious that if a rock carries notable amounts of minerals that contain as essential ingredients any of the minor constituents, these should always be determined. Thus, Cl and SO_3 should be included in the analysis if the rock contains sodalite or noselite; TiO_2 , if it contains titanite, ilmenite, hornblende, augite, or magnetite; P_2O_5 , if it contains apatite, and ZrO_2 if it contains considerable zircon or eudialyte. If these constituents are not determined the analysis will not show adequately the composition of the rock, or, as Clarke puts it, "the petrographer has been more thorough than the chemist."

It is chiefly for this reason that a microscopical study of the rock section should always precede the analysis. The conscientious chemist who is not a petrographer, and who therefore does not know what minor constituents are especially to be looked for, can only make sure of the completeness of his work by the determination of everything possible. The results of his work will be of value, yet in many analyses part of his labor may be quite unnecessary, involving a waste of time which would be obviated if the petrographer furnished with the material an indication of the minor substances that should especially be looked for.

Although the determination of all constituents, even those which are present in mere traces, is to be desired, yet in practice a compromise must be made, generally, between the degree of completeness and the time to be devoted to practical analytical work. The determination of most of the minor constituents takes considerable time, and if the number of analyses to be made is great or the time available is short it may not be advisable to determine all the lesser constituents, but only those essential to a proper understanding of the rock. This is especially true of the rarer substances, such as ZrO_2 , Cr_2O_3 , V_2O_5 , F, NiO, CoO, CuO, and SrO, as well as SO_3 and Cl in rocks without the sodalite group of minerals. On the other hand TiO_2 , P_2O_5 , MnO, BaO, and S, which are now known to be commonly present and widely distributed, should be determined in every analysis that aims at completeness. It is also generally of interest to determine Cr_2O_3 and NiO in the most femic rocks, especially if olivine is abundant, as they are likely to be present in considerable amount.

In view of the length of time needed to make a rock analysis and the very considerable addition to it involved in the determination of the rarer

elements the following general procedure seems to me to be advisable in investigating a region, locality, or volcano where there is much variety in the igneous rocks. At least two analyses should be made of each of the main rock types, the specimens to be taken from different parts of the mass or from different flows, and one analysis of each of the minor types. All these analyses should show, besides the nine main constituents, TiO_2 , P_2O_5 , and MnO , but not the rarer elements, which need be determined only in two or three of the analyses, each representing one of the main types from the most salic to the most femic, as their amounts and variations are small and the verification of their presence or absence in the region or in the various magmas is of most importance. We would thus obtain, with a minimum expenditure of time, the data needed for a proper petrologic discussion of the region in its main features and a sufficient knowledge of the presence of the rarer elements to permit its comparison with others.

In discussing this matter a point to bear in mind is that the determination of certain of the minor constituents affects the figures for other and often very important ones. This arises from the methods of analysis necessarily employed, in which several constituents are precipitated together in one operation, and subsequently some of them separately determined, the figures for one being represented by the difference. Of these those of by far the most influence are titanium dioxide and phosphorus pentoxide. These are not only almost always present, often in very considerable amount, but their determination affects that of the highly important alumina. In the course of the analysis alumina, ferric oxide, titanium dioxide, and phosphorus pentoxide are precipitated together, the three last are determined separately, and the alumina is estimated by difference from the sum of the four, since so far no satisfactory method has been devised for its independent determination. It is obvious, therefore, that, if the oxides of titanium and phosphorus are not determined, the figure for alumina will be too high. In analyses of all but the most salic rocks the error may be of great moment, for these two oxides may be present in a very considerable amount, and the alumina is the only measure we have for the calculation of the amount of anorthite—modal or normative—from the analysis.

Similarly, the nondetermination of ZrO_2 and Cr_2O_3 will raise the figures for alumina, since these are also precipitated together. In most analyses, however, the error due to these defects will be negligible, owing to the minute quantities of these oxides usually present.

As the vanadium is thrown down with the phosphorus as a vanadomolybdate its amount should be subtracted from the P_2O_5 and not from the alumina. Vanadium also affects the determination of ferrous oxide, and if presumably present in more than traces

it may be determined and a proper correction applied to the ferrous oxide in the most accurate work. Fortunately this course will seldom be necessary, as its amount is almost always exceedingly small.

As strontia is precipitated with lime as oxalate, its nondetermination will make the apparent amount of lime too high. But strontia rarely occurs in more than traces, so that this error is negligible for all but the most accurate investigations.

Lithium remains with the sodium after separation of the potassium as platinichloride, but has rarely been found in quantity great enough to warrant its estimation.

In Professional Paper 14 the determination of manganese was discussed and the conclusion was reached, in view of its usually very small amount and the liability to error in alumina involved in the acetate method, that its determination was not usually called for as essential to good work. Since then the simple, accurate, and expeditious colorimetric method for this element has been introduced in rock analysis, so that it may be said that it is always advisable to determine it. The long list of analyses made by the chemists of the United States Geological Survey, as well as those made elsewhere, show that, though almost always present, its amount is very small, in general little more than a trace. Indeed, it is of interest to note in this connection that Clarke's estimate of the average composition of the igneous rocks of the United States shows that the amount of manganese in them is only about one-sixth of that of titanium, and is even less than that of phosphorus. In view of the great variety of igneous rocks represented by these analyses and of the very high character of the analytical work, the high figures sometimes found for this oxide in analyses are to be regarded with suspicion, the probability being that in them the error already spoken of has been made.

That the nondetermination of manganese will affect the figures for other constituents is certain, but to what extent is not very clear. If the alumina, etc., has been separated with ammonia water, a portion will be thrown down and be weighed as alumina. Part of that which passes through in the filtrate will be thrown down with calcium oxalate and weighed as lime. But as manganese oxalate is slightly soluble in water, some of the manganese will be thrown down as phosphate with the magnesia and weighed with this. Little is known of the various proportions of the manganese which will thus be distributed, and the matter is one that calls for investigation. Hillebrand¹ gives some figures of George Steiger for carbonate rocks, which indicate that most of it generally falls with the magnesia, an equal or much less amount with the alumina, and only a very small portion with the lime.

¹ Hillebrand, W. F., U. S. Geol. Survey Bull. 422, p. 114, 1910.

In regard to the determination of water, I am in accord with Dittrich¹ and Hillebrand,² that the rock powder taken for analysis should be air dry, and that it is advisable (though not necessary) to discriminate between combined and hygroscopic water—that is, water driven off above and below 110°. The importance of this distinction appears to be much exaggerated, as the amount of “hygroscopic” water driven off is not constant for any given sample of rock powder, but varies with the temperature and the time of heating, thus including some of what would be called “ignition” water. Furthermore, it is well known that a small but perceptible amount of water is adsorbed from the atmosphere by rock powder. The remarks of Hillebrand on the inadvisability of the method for the determination of water by “loss on ignition” will be concurred in by every experienced analyst who has considered the matter, because of the oxidation of ferrous oxide and the loss of volatile constituents.

Except where minerals containing water or hydroxyl, as analcite or muscovite, are primary components of a rock, the determination of water is not essential to a proper comprehension of the rock magma, but its amount, as well as that of carbon dioxide, is of importance as a measure of the freshness of the rock. The determination of water must therefore be regarded as essential to every rock analysis, and that of carbon dioxide also when the presence of calcite or cancrinite or the altered condition of the rock demands it.

In this connection a common practice may be briefly alluded to, namely, that of deducting water and carbon dioxide when the rock is not fresh, calculating the remainder to 100 per cent and assuming that the result represents the composition of the original unaltered rock. This assumption is unwarranted and may lead to erroneous conclusions, since the processes of weathering or alteration do not usually consist in the simple addition of water and carbon dioxide, but in the assumption of these concomitantly with changes, either additive or subtractive, in some or all of the other components. We are not yet able to determine these with much success. Furthermore, by concealing the original summation, such a procedure, like any recalculation to 100 per cent, unless the original figures are given, deprives others of one of the methods of judging the value of the analysis.

RATING OF ANALYSES.

METHOD OF RATING.

We have hitherto considered rock analyses from the point of view of the analyst. It remains to discuss them from that of the petrographer who wishes to use the results, and who therefore needs to have some means of judging their reliability. For this purpose it is necessary to discuss the features of an analysis on

which this judgment may be based, and it will also be convenient to formulate a mode of expressing concisely the general character of an analysis. The expression of the relative worth of an analysis may conveniently be called its “rating,” in analogy with that of commercial houses.

The user of the analysis must rely on the judgment of the collector and the analyst that the specimen, both as to locality and size, correctly represents the rock mass, unless some reason appears to the contrary. The analysis in itself rarely gives any decisive indication as to this point.

Analyses of the groundmass of a rock are, however, not uncommon, and may be briefly discussed. For the general purposes of petrography such analyses are of little use, and they have been excluded from the present collection. On the other hand, for the solution of certain special problems they may be of great value. It must be pointed out, however, that an essential adjunct to their use is a knowledge of the relative amounts of the phenocrysts and the groundmass, unless only a knowledge of the composition of, for example, glassy or microaphanitic groundmasses be desired. If the purpose is the study of the order of crystallization, or some such thing, a knowledge of the quantitative relations is indispensable.

Unfortunately, this knowledge is wanting in most cases, quantitative relations being given only in analyses of the portions soluble and insoluble in acid. This is another example of the prevailingly qualitative way of regarding petrological problems.

It can scarcely be reiterated too often that the science of petrography must become quantitative. The time has passed when a simple statement of the minerals composing a given rock and a description of their physical properties will suffice. We need to know in addition the relative amounts of the minerals as accurately as may be, with their chemical composition, as well as that of the rock itself, derived either from chemical analysis or from determination of the quantitative mineral composition. Otherwise many of the broadest and most fundamental problems in petrology will be incapable of solution, and the science will still consist of vague gropings after the truth, because some of the most essential facts—the quantitative relations—remain neglected and unknown.

ACCURACY.

EVIDENCE AVAILABLE.

Assuming, therefore, that the analysis is representative as far as the material goes, we have its accuracy and its completeness as means of judging its value. The features on which this must rest, as far as accuracy is concerned, may be stated as follows:

Internal evidence	(a) Agreement with the mode.
	(b) Summation.
External evidence	(c) Analyst.
	(d) Methods of analysis.
	(e) Indirect evidence.

¹ Dittrich, M., *Mittheil. Badischen Geol. Landesanst.*, vol. 3, p. 79, 1894.

² Hillebrand, W. F., *U. S. Geol. Survey Bull.* 422, p. 65 et seq., 1910.

INTERNAL EVIDENCE.

Agreement with the mode.—It may seem superfluous to state that the chemical analysis of a rock must accord with its quantitative mineral composition as determined by the microscope. Such a statement is however, necessary, as a study of the many discordant results given in the present collection will clearly show.

The mode of a rock affords the best means of ascertaining whether or not the analyst has done his work well. If the composition and the amounts of the minerals present are known, the chemical analysis can be easily checked by the calculation of the chemical composition from the mineralogical data. The agreement need not be exact, and indeed it seldom is except under the most favorable conditions, for the measurement of the amounts of the constituent minerals seen under the microscope can not be of the highest order of accuracy, and assumptions must often be made as to the chemical composition of some of them. But the result will often be sufficiently accurate to show whether or not notable analytical errors have been made.

In the great majority of cases, however, only the roughest kind of quantitative data are either given in the descriptions or conveyed by the present rock names, if indeed one is fortunate enough to have any kind of quantitative information as to the mineral composition vouchsafed him. Here one can detect only errors of a flagrant kind and of magnitudes involving several per cent of certain constituents.

In considering the possibility of any of the errors already mentioned, the judgment of the petrographer, based on a knowledge of the chemical composition of minerals as well as on his knowledge of analytical work, comes into play. All the chemical features must be taken into consideration in connection with the description, especially in the absence of exact quantitative mineralogical data.

Thus high alumina (for example, 20 per cent or more) in a rock containing 50 per cent or less of silica, and even with low magnesia, is presumably, but not necessarily, due to error in the separation of alumina and magnesia. It may be caused by the non-determination of titanium and phosphorus oxides, or by the presence in abundance of anorthite or nephelite, which will be indicated by correspondingly high lime or soda. Apparently high soda and low potash in a so-called orthoclase rock may arise from an imperfect description or incorrect identification of the feldspar, which may be in reality a soda-orthoclase.

It must also be borne in mind that the microscopical may seemingly be at variance with the chemical analysis, and yet the chemist may be undeniably correct. This is especially true of analyses of very fine-grained holocrystalline or hypocrySTALLINE rocks, and not infrequently further, more critical, microscopical study will reveal the presence of a constituent which has been overlooked but which is

manifest only after the analysis has indicated its existence. On the other hand, the most careful microscopical study may not reveal the presence of certain minerals, such as quartz or orthoclase, which the analysis shows must necessarily be present. These undiscovered constituents have been called by Id-dings¹ "occult" minerals. This phenomenon is possibly due in part to solid solution.

An example of this phenomenon is afforded by the kulaite of Phrygia, investigated by me, in which the rather abundant nephelite was at first overlooked in the partly glassy groundmass and was discovered only when repeated careful chemical work and calculation of the mode showed that it was necessarily present.²

Other well-known rocks whose chemical analyses do not correspond with their microscopical characters are the wyomingite and orendite of the Leucite Hills. In the wyomingite, although modally the only salic minerals visible are leucite and noselite, the analysis shows a large excess of silica. In the orendite there is an excess of alkalis over alumina, with excess of silica in one case. These discrepancies have not yet been explained, but there can be no doubt of the high degree of accuracy and completeness of the analyses³ or of the mineralogical determinations.

Another example is the lava of Grenada, West Indies, called "augite andesite" in the first collection (p. 353), with the remark that the norm and mode do not agree. Prof. Harrison has kindly informed me that a reexamination of the rock shows the presence of considerable nephelite in the glassy base (analogous to the base of the kulaite) and that it is really a nephelite tephrite.

The norm and mode are seemingly at variance, though the analysis is correct, in many basalts and similar rocks in the dofemane and saffemane classes. The norms of many of these rocks show several per cent of quartz, though the presence of this is not mentioned in their descriptions; or the rock may even carry a considerable amount of olivine. Examples may be found in andose (II. 5. 3. 4), hessose (II. 5. 4. 4-5), camptonose (III. 5. 3. 4), and auvergnose (III. 5. 4. 4-5). If the rock is holocrystalline, examination often reveals the presence of small amounts of quartz, generally as micropoikilitic interstitial patches. Quartz also occurs thus with olivines, or it may be occult in the groundmass. Here we are dealing with the fact, established by Bowen and Anderson,⁴ that olivine crystallizes out—that is, it is stable and less soluble—at high temperatures, leaving the liquid with an excess of silica, which appears as quartz if the cooling is rapid. If the cooling is sufficiently slow, the olivine will be

¹ Id-dings, J. P., *Igneous rocks*, vol. 2, p. 19, 1913.

² Washington, H. S., *Jour. Geology*, vol. 8, p. 611, 1900.

³ Cross, Whitman, *Am. Jour. Sci.*, vol. 4, p. 132, 1897.

⁴ Bowen and Anderson, *Am. Jour. Sci.*, 4th ser., vol. 37, p. 499, 1914. Bowen, N. L., *Am. Jour. Sci.*, 4th ser., vol. 38, p. 260, 1914.

reabsorbed, forming metasilicate (hypersthene) with the excess silica.

But unless there is reason to suspect the presence of occult minerals, and unless explanation is afforded by the description to account for the peculiarities of the analysis we may, in general, assume that errors have been made and consider the analysis untrustworthy in this respect.

In this connection it may be well to mention that the calculation of the norm of a rock is of great use in checking an analysis. Though this calculation may appear complicated, it is as a rule really simple and easily and quickly made. Some knowledge of the relations of the standard and the mafic minerals then affords a means of making sufficiently close determinations of the mineral molecules to permit a comparison of the mode with the analysis.

It must not be forgotten, even here, that in the absence of a knowledge of the quantitative relations of the component minerals very serious analytical errors may not be revealed by calculation of the mode, in this or any other way, from the chemical data. The error in one or more constituents may amount to several per cent, and yet a mode can be calculated which will apparently agree with the description or with a qualitative microscopical examination. This fact is illustrated by my own first analysis of the ciminite of Fontana Fiescoli, near Viterbo.¹ The mode, as calculated from this analysis,² seemingly agreed with the microscopical examination, although subsequent investigation and analysis showed that the alumina and the magnesia were, respectively, too high and too low by about 3 per cent.³

Of the very common error involved in the incomplete separation of magnesia and alumina, perhaps the most noteworthy illustration is found in Doelter's analyses of the augitites of the Cape Verde Islands. These analyses show 16 to 24 per cent of Al_2O_3 and only 3 to 5 per cent of MgO . It is significant of the common ignorance of possible analytical error that Rosenbusch,⁴ who gives some of them in his table of analyses of augitites, merely remarks, "ueberraschend ist ihr höher Gehalt an Al_2O_3 bei niedriger MgO ."

Another example of the error in the separation of alumina and magnesia is seen in an analysis of the essexite of Rongstock,⁵ which shows 46.93 per cent of silica, 24.19 alumina, and 2.42 magnesia. Part of the high alumina is to be ascribed to titanite and phosphoric oxides, which were not determined; but, even after due allowance is made for these, it is evident that some of the magnesia has been weighed with the alumina. This will clearly appear by comparing the analysis with two other analyses of the same rock

mass published by Hibsches,⁶ which, with 50.50 silica, show about 17.85 alumina and 3.35 magnesia. The error will be even greater than that indicated by the difference between these figures, for the percentages of silica and other constituents shown by the analysis published by Lang make it certain that his specimen was more femic than those of Hibsches.

Another example of this very common error is the first analysis of the monchiquite of Shelburne Point,⁷ which gave 18.06 alumina and only 1.12 magnesia, although hornblende and olivine are abundant. Attention having been called to the manifest discrepancy,⁸ it was reanalyzed by another chemist, with a result showing 15.87 alumina and 8.32 magnesia. Although this second analysis is by no means above reproach, yet it is sufficiently accurate to show that in the first analysis the greater part of the magnesia had been precipitated with the alumina. It is also almost certain that the two chief errors in the first analyses had been made in the determination of iron oxides—one due to the partial oxidation of the ferrous iron in the course of its determination and one involved in the reduction of the solution containing total iron by insufficient treatment with hydrogen sulphide. The figures for the alkalis also are very improbable and indeed the only figures that have any semblance of correctness in this unfortunate example are those for silica, lime, and water.

An illustration of the incorrect determination of the iron oxides, specimens of the rock being taken as a basis of judgment, is furnished by the oft-cited analysis of the syenite of Biella⁹, in which the ferric oxide is given as 6.77 and the ferrous as 2.02. Here there is a large excess of ferric oxide over that needed for the maximum possible amount of magnetite or for the augitic molecule $\text{Fe}_2\text{O}_3 \cdot (\text{Mg}, \text{Fe})\text{O} \cdot \text{SiO}_2$, with no hematite in the rock to account for it. We are therefore forced to conclude that a partial oxidation took place in the determination of ferrous oxide, resulting in the erroneous figures reported.

A striking example of the error due to incomplete precipitation of alumina by the sodium-acetate method in separating manganese oxide is seen in two analyses of the quartz-syenite of Fourche Mountain, Ark.¹⁰ One analysis gives 13.45 alumina and 5.29 manganous oxide; the other gives, respectively, 18.15 and 1.00, the sum of the first pair being 18.74 and that of the second 19.15. Here it is obvious that in the first analysis more than 4 per cent of alumina has been weighed as " MnO ," and it is almost as certain that the 1 per cent of the second is too high from the same cause, for the rock is very largely feldic (feldspathic), and no manganese-bearing minerals are mentioned as present.

¹ Washington, H. S. Jour. Geology, vol. 4, p. 837, 1896.

² Idem, vol. 5, p. 354, 1897.

³ Washington, H. S., Am. Jour. Sci., vol. 9, p. 45, 1900.

⁴ Rosenbusch, H., Elemente der Gesteinslehre, p. 378, 1901.

⁵ Lang, H. O., Tschermak's Mineral. Mittheil., vol. 15, p. 191, 1896.

⁶ Hibsches, J. E., idem, p. 487.

⁷ Kemp and Marsters, U. S. Geol. Survey Bull. 107, p. 34, 1893.

⁸ Kemp, in Weed and Pirsson, U. S. Geol. Survey Bull. 139, p. 116, 1896.

⁹ Cossa, Mem. Acc. Sci. Torino, vol. 18, p. 28, 1875.

¹⁰ Williams, J. F., Ann. Rept. Geol. Survey Arkansas, 1890, vol. 2, p. 99, 1891.

Two analyses, by different chemists, of a sölvserbite of Port Cygnet, Tasmania, given by Paul¹ also afford examples of the same error. One shows 18.21 Al_2O_3 and 2.61 MnO and the other 20.91 Al_2O_3 and 0.77 MnO.

Examples of error in the determination of the alkalis are furnished by a large series of analyses by Ricciardi of Italian leucite-bearing rocks. One of these rocks is a leucite-basanite of Monte Jugo, near Montefiascone, which, with 48.30 silica and 15.07 alumina, shows only 0.94 soda and 1.73 potash. The amount of potash reported in the analysis yields but 7.8 per cent of leucite and is certainly far too low. This analysis and others of basanites of this region by the same chemist are so low in alkalis (especially potash) that if they were correct the rocks would necessarily carry as much as 10 per cent of quartz, even on the assumption that all the bases took their highest possible quota of silica, yielding orthoclase instead of leucite and hypersthene instead of olivine. An analysis of the Monte Jugo rock (both specimens coming unquestionably from the same small quarry) made by me² shows 47.39 SiO_2 , 14.79 Al_2O_3 , 1.49 Na_2O , and 6.93 K_2O , and yields a norm that is quite consistent with the measured mode of the rock.

What appears to be an instance of the coprecipitation of lime with alumina (see p. 14) is seen in two analyses of "albite-oligoclase porphyry," given in porphyrite (p. 1015) and L.5.2.5 (p. 301). Comparison of these two makes it appear probable that much of the lime in the first was precipitated with the alumina through the use of impure ammonia water, as there is by no means sufficient to form enough of the anorthite molecule to justify the use of the qualifier "oligoclase."

Many more examples of incorrect determinations could be cited, both of these and of nearly all other constituents, but the above must suffice to point out the importance of close scrutiny of the analytical figures in conjunction with the mineralogical data. It may be mentioned that in none of the analyses cited, and indeed in scarcely any analysis containing serious error, has misgiving been expressed by the petrographer at the time the analysis was published as to the possibility of error, nor has there been any comparison of the analysis and the mode, no matter how apparent the incorrectness. As a result of some experience in judging analyses it may be added that in manifestly poor work the figures for silica and lime are generally the only ones which may be accepted with some degree of confidence as to their approximate accuracy.

*Summation.*³—The summation of a rock analysis may be a good index to its character, and should always be taken into consideration in rating it. In

discussing the limits in the summation that are consistent with good work, Hillebrand puts the matter very clearly⁴ in his remarks to the effect that a summation somewhat over 100 per cent is better than one below 100, and he also assigns the limits for good work as 99.75 and 100.50. With his reasoning and his limits I fully concur, though in practice one may be lenient and extend the allowable limits to 99.50 and 100.75 with advantage.

Though figures that do not fall within these limits are good evidence of error, either of omission or commission; in the analysis, the converse is not necessarily true—that figures within these limits are proof of correct results. Several errors may balance one another, so that the summation may be very close to 100, although the analysis is very poor. At the same time, unless indications appear that the analysis is not good, it must be taken at its face value. A good summation is evidence of good analytical work, as far as it goes. On the other hand, very low or very high results prove that an analysis is incorrect in some particulars, or possibly as a whole.

A low summation may be due to the nondetermination of some constituent, to poor methods, to careless manipulation, or to all combined. The determination of water by "loss on ignition" tends to yield a low total, owing to the oxidation of the ferrous oxide. This error will reduce the apparent weight of water and may give an unfavorable summation, though the other essential constituents may have been accurately determined.

It must also be borne in mind that a low summation can not be ascribed to the nondetermination of a constituent which is precipitated and weighed with others that have been determined, such as TiO_2 and P_2O_5 with Al_2O_3 , or SrO with CaO. If it is due to incompleteness, the missing constituent must be sought among those which are determined independently in the course of the analysis, such as CO_2 , SO_3 , Cl, S, or BaO. If the deficiency is marked and the description of the rock indicates that none of such constituents are present, the low summation must be held as evidence of error somewhere in the analytical work.

It may also be noted in this connection that if ferric oxide is calculated as ferrous there will be a deficiency of one-tenth of its weight, due to the loss of oxygen. The converse is also true. Consequently, if the iron oxides are given only as FeO, the total of the analysis will be too low by one-tenth of the amount of ferric oxide really present. And, conversely, if they are given as ferric oxide the sum will be too high by one-ninth of the ferrous oxide. If the amount of either is considerable, as it usually is in very ferric rocks, the nonseparation of iron oxides may thus give rise to an apparently poor or an apparently good summation.

¹ Paul, F. P., *Tschermaks Min. Pet. Mit.*, vol. 25, p. 295, 1906.

² Washington, H. S., *Carnegie Inst. Washington Pub.* 57, p. 124, 1906.

³ This topic has been discussed by M. F. Connor (*Cong. géol. internat., Comptes rendus*, p. 888, 1914).

⁴ Hillebrand, W. F., *U. S. Geol. Survey Bull.* 422, p. 27, 1910.

In analyses of rocks containing such minerals as sodalite, fluorite, much biotite or apatite, pyrite or pyrrhotite, in which chlorine, fluorine, or sulphur has been determined, it must be remembered that an equivalent amount of oxygen is to be deducted to get a correct result. If the amount of these constituents is considerable, an apparently high summation may prove to be satisfactory, whereas one that lies within the assigned limits may prove to be too low.

It is possible that a summation higher than that allowable may be due to the determination of iron oxides as Fe_2O_3 only, the excess being attributable to the excess of oxygen in this over that in FeO , as just explained; or it may be due to the fact that no correction has been made for the oxygen equivalent to chlorine, fluorine, or sulphur, also mentioned above.

In the absence of these two possibilities, the high summation can be attributed only to analytical errors, such as impure reagents, poor glassware, imperfect washing of precipitates, incomplete ignition, or a dusty laboratory. No explanation based on incompleteness and the nondetermination of some constituent will apply here, and if the excess above the allowable limit is considerable the presumption is strong that the analytical work was careless.

Furthermore, it must be remembered that the excess or deficiency in all high or low summations can not be distributed among all the constituents, for "it is more than likely to affect a single determination."¹

The importance of the summation in determining the rating of an analysis lies in the fact that it is itself presumptive evidence of good or poor analytical work somewhere in or all through the analysis, so that if the sum falls within the limits assigned for good work the analysis is presumably good, provided that no marked discrepancy is evident between the analysis and the described mode, that the degree of completeness is satisfactory, and that there is no other evidence tending to throw doubt on the results.

On the other hand, if the sum is considerably below or above the limits fixed the evidence is much stronger than the apparently slight departure of a fraction of 1 per cent from the limits might at first sight seem to indicate, as it shows that some error or errors have been made, and that consequently the character of the analytical work as a whole is open to suspicion. Thus a summation of 99.00 may be due to the nondetermination of some constituent, but in the absence of evidence to this effect we can only conclude that some error has been made. This departure of but one-half of 1 per cent from the limit of the standard of good work may affect either the silica or the alumina, the constituents that are present in largest amount, and may not seriously affect the value of the analysis; or it may affect some constituent present in less amount,

and thus be of relatively greater importance; or it may be distributed among several constituents. We have no means of deciding the nature of the errors in most of such analyses, but we must conclude that, as the work is certainly incorrect, even to so small an extent, in some particular, it may be incorrect in others, and possibly all through.

Summations somewhat above or below the limits fixed are excusable in analyses of complex minerals or of meteorites if the material available for analysis is scanty or the analytical processes are especially complex or difficult, and the allowable possible limits of error are consequently considerably greater than that fixed for analyses of igneous rocks. It must also be remembered that the analyses of minerals may be checked by their agreement with the known calculated chemical composition. For most analyses of rocks, on the other hand, we have no such check, as adequately exact data as to the relative amounts of the constituent minerals are seldom given. If, therefore, the analysis of a rock is satisfactorily complete, there is no excuse, as Dr. Hillebrand remarks, for a summation that does not fall within the somewhat liberal limits here assigned.

In a series of analyses by the same analyst, some of the analyses may show summations within the acceptable limits, whereas those of others may be as high as 102 or as low as 98 (an actual case). The bad summations in such a series of analyses indicate serious errors in the whole series and lead one to reject those analyses of the series whose summations are apparently acceptable, for one is justified in assuming that the good summations result from the chance balancing of errors.

In stating analyses it is the almost universal practice to use two places of decimals, a practice justified because the last figure, though not very significant, expresses the limit of accuracy in weighing (0.01 milligram), and because of uniformity. Also, when the amount of any constituent is less than 1 per cent, the use of but one decimal is clearly not adequate. The use of three decimals is unjustifiable, for it implies a greater degree of accuracy than can be reached in practice, and my experience shows that most of the analyses thus stated clearly afford other internal evidence of unsatisfactory work.

EXTERNAL EVIDENCE.

Analyst.—Among the factors that may come under the head of "external evidence" the analyst himself is the most important, but for several reasons this factor can be used only with caution and subsidiary to other criteria. That is, the analyst is to be judged by his work rather than the work by the analyst.² Though as a general rule it may be said that the work of a beginner will probably not be so good as that of an expe-

¹ Hillebrand, W. F., U. S. Geol. Survey Bull. 422, p. 28, 1910. Cf. Appendix to Fresenius's Quantitative Analysis.

² H. H. Robinson, in a recent paper (Am. Jour. Sci., vol. 41, p. 257, 1916), discusses the work of different analysts on the basis of the summations of their analyses.

rienced analyst, yet exceptions occur; so that we must not be too sweeping in our judgment of the analyses of a student unless they show distinct signs of poor work. On the other hand, an experienced analyst may turn out analyses that are manifestly incorrect, possibly because of the employment of poor methods or poor reagents, so that in the appraisal of these the long experience of the analyst will count for little, for a rock analysis made by him which can not be checked by comparison with the mode will be looked on with misgiving.

A word may be said of the analytical work of women: I know of but three¹ who have made any considerable number of rock analyses, and I have found the work of all to be uniformly good. It would seem that analytical work is especially well adapted to feminine characteristics, and that rock analysis could be advantageously undertaken by women.

Methods.—The methods employed in making an analysis are seldom stated and are therefore not often available as a means of judging its value. When they are known, however, a petrographer who is experienced in rock analysis can determine the extent to which they may affect the value of the analysis.

Indirect evidence.—Evidence of an indirect nature is sometimes afforded by analyses of the same or similar rocks by other analysts, which may either corroborate or discredit an analysis under consideration. Also, as noted above, if some analyses of a series show evident signs of error the presumption is strong that the others are also subject to the same error unless they can be checked by comparison with the mode.

COMPLETENESS.

In order to ascertain fully and accurately the composition of a rock the exact amount of every one of its constituents must be determined, so that, in general, the more constituents determined the more closely will the analysis represent the composition of the rock. This statement, however, is subject to the limitations that some rocks are of simple composition, containing only a few chemical constituents, and that the statement of figures for all these possible constituents is no evidence that they have been correctly determined. Assuming, however, that the analysis is accurate and that the rock is of complex composition, as it usually is, we may briefly discuss the relative importance of the various constituents in the rating of analyses.

Speaking generally, and bearing in mind the possible occurrence of rocks containing large amounts of minerals that are regarded as rare, or that are usually only sparingly present, it may be said that in the most satisfactory work every constituent should be determined that is present in amount greater than traces, as already defined, or the knowledge of whose absence or presence, even in minute quantity, is essen-

tial to our study of the rock or to the object of the investigation.

This determination will include the nine main constituents that are almost universally present and whose absence would be a matter of interest; that is, SiO_2 , Al_2O_3 , Fe_2O_3 , FeO , MgO , CaO , Na_2O , K_2O , and H_2O . The iron oxides should be determined separately, or the absence of one or the other should be shown, even in analyses of the most salic rocks, though it must be borne in mind that the influence of this separate determination increases with increase of the femic components. Likewise, the alkalis should always be determined, of course separately, and even in the most femic rocks their presence in traces or their complete absence should be definitely proved. CaO and MgO should also be determined, even though they exist actually as traces, as defined above. H_2O should, in general, be determined directly, and not by "loss on ignition," but the distinction between that below and that above 110° is not usually essential, yet is desirable. CO_2 should, however, be determined if the rock is not fresh, or if calcite or cancrinite be present.

It is next of interest to know the amounts of the so-called minor constituents likely to be present in notable amount, including TiO_2 and P_2O_5 in nearly all rocks, except the most salic ones, Cl and SO_3 in rocks containing sodalite, noselite, or haüyne, S in a good many femic rocks, ZrO_2 in rocks with nephelite, much eudialyte, or zircon, and in alkalic, especially sodic, rocks in general, and Cr_2O_3 and NiO in many dofmanes and perfemanes. It is also well to determine BaO in alkalic and especially potassic rocks.

Of course any one of these may at times assume the importance of one of the nine main constituents, as TiO_2 in nelsonite and ores produced by segregation or differentiation, Cl and SO_3 in such rocks as taimyrite, tawite, and haüynophyre, P_2O_5 in the apatite syenites of Finland and nelsonites, or Cr_2O_3 in many dunites.

Assuming that, as usual, the minor constituents are present in only small amounts, the most noteworthy are TiO_2 and P_2O_5 , especially the former. Both are almost invariably present and are also of special importance, because their estimation affects that of Al_2O_3 , as already explained. In fact, on this account these two should always be determined in any analysis that is to be considered good. MnO , although also nearly always present, is of comparatively little consequence, and its determination or nondetermination should not affect seriously the rating of the analysis.

Of the other generally rare or very minor constituents, such as ZrO_2 , Cr_2O_3 , NiO , BaO , SrO , little need be said. Except when they assume an important rôle, as already mentioned, they scarcely affect the value of an analysis for general purposes. Still, since they are or may be of great value for the study of certain broad and as yet undeveloped problems, and as their determination, other things being equal, is

¹ M. W. Adams, L. Hezner, and N. Sahlbom.

evidence of careful and thorough analytical work, analyses in which they are reported must be rated higher than those in which they do not appear.

RATING ADOPTED IN THE TABLES.

We come now to the practical application of the foregoing remarks—that is, to a concise expression of our judgment of the value of any given analysis, based on the features described. We have been accustomed to express our judgment in a rough way by calling analyses good, or poor, or bad. But there seems to be a need of making these terms more precise, of defining their meaning more exactly.

As a preliminary, the fact must be recognized that though the features discussed permit a fairly accurate judgment on most analyses, some or all of these features are not invariably available and an analysis must often be taken, so to speak, at its face value.

Thus it frequently happens, especially with the prevalent almost purely qualitative descriptions, that we can form little or no estimate of the correspondence of the analysis with the mode. In a gabbro, for instance, of which it is merely known that the constituent minerals are labradorite, augite, and magnetite, the analysis may show high Al_2O_3 and low MgO . This showing may be due to the common error in the separation of these two; or, again, it may be due to the fact that the rock is very salic, so that anorthite is abundant and the mafic minerals present in small amount, though the rock would be called a gabbro, equally with a very femic one, in the current vague qualitative systems. In the first case the analysis would not and in the second case it would correspond with the mode, and the analysis would be, respectively, either incorrect or correct. But in the absence of some evidence to determine the matter, such as an indication of the quantitative relations of the two minerals in the description, we should have no means of deciding the question provided that CaO was high enough, with the alkalis, to satisfy the Al_2O_3 , and if the analysis were otherwise good we should scarcely be justified in rejecting it on this account.

We must also make the general assumptions, in the absence of evidence to the contrary, that the material analyzed is representative of the rock mass and that the analyst is competent and the methods employed are reliable.

Admitting these serious difficulties in judging many analyses and the fact that any such concise characterization is necessarily to some extent arbitrary or subjective, I venture to propose and have used throughout this collection the following practical method of expressing the rating of analyses.

The method is closely analogous to that of Dun and of Bradstreet in rating the credit of mercantile houses in the United States, which, indeed, suggested the present form of the scheme. In commercial

rating the credit of a firm is dependent on two factors—the amount of capital invested or at command and the personal character and reputation of the individuals. The rating or credit will be high as the personal character and the capital both approach the maximum.

Following out this analogy, our judgment of analyses is dependent on two factors—the accuracy and the completeness. For most of the purposes for which rock analyses are used each of these may compensate the other to a certain extent. Thus if the analysis is not very complete this fault may be partly compensated for by the accuracy of the determinations which have been made, and, conversely, if the accuracy of some of the determinations is not entirely satisfactory a complete determination of all the constituents may partly make up for it. This, of course, should be within reasonable limits. Furthermore, the higher the standard of each factor the more valuable will be the analysis.

To express the degree of accuracy the letters A, B, C, D are used, and to express the degree of completeness the figures 1, 2, 3, 4. These are used in combinations of a letter and a figure, the letter preceding, since, in general, the degree of accuracy is more important than that of completeness. The bases on which these are assigned are as follows, the limitations and the frequently arbitrary character of the scheme being understood:

A is used when the analysis gives evidence of the highest degree of accuracy—that is, when it corresponds well with the mode and when the summation is between the limits 99.50 and 100.75. When the analyst is of the first rank and when the methods are known to be of the best, these facts constitute additional reasons for the assignment of this letter. It must be understood, however, that in rating the analyses in the collection I have usually refrained from considering the personal competence of the analyst, as this is often a difficult and always a delicate matter. So, except when the methods or general results were known to be not very reliable or positively bad, I have generally used only the impersonal features of each analysis in deciding its rating.

B is used when the analysis and the mode correspond and when the summation is between 99.50 and 99, or between 100.75 and 101.25. Due allowance must, however, be made here, as elsewhere, in considering low summations, for the effect of the non-determination of certain constituents, as already explained, and in considering high summations for the correction to be applied in the presence of Cl or S.

C is used when the analysis corresponds fairly well to or varies but little from the mode and if the sum is between 99 and 98.50 or between 101.25 and 101.75.

D is used when the analysis varies decidedly from the mode in any essential particular, or when the sum

is below 98.50 or above 101.75. It also applies when the methods used for determining important constituents are known to be bad, or when an analysis, apparently good, is made up by combining parts or the whole of two or more poor analyses.

Analyses stated in one or three decimal places have been consistently rated 1 degree less as regards accuracy than they would have been had they been stated in two decimals, as it has been found that they are generally of inferior quality. Analyses stated in only one decimal place fail to conform with the weighings of the analysis and do not adequately show the amounts of the minor constituents. For these and other reasons I differ with the recent usage of Prof. Milch.¹ This has been discussed elsewhere.²

1 is assigned when the analysis is perfectly or nearly complete, as when, in addition to all the main constituents and those of secondary importance, ZrO_2 , Cr_2O_3 , NiO , BaO , SrO , and the like, or several of them, are determined in rocks not containing notable amounts of minerals having these as essential components. In general MnO should be determined for this rating, but not necessarily, and the same is true of the separate determination of combined and hygroscopic water, though the determination of water as "loss on ignition" renders the application of this rating doubtful. The iron oxides must be separately determined in all analyses to which this figure can be applied.

2 will be used when all the main constituents, including both oxides of iron, have been determined, as well as the constituents of secondary importance, including TiO_2 and P_2O_5 in nearly all rocks, Cl and SO_3 in those that contain abundant minerals of the sodalite group, and so on, as has been explained. The minor constituents, ZrO_2 , BaO , etc., are not determined in analyses rated with this figure. 2 will be used also for analyses of very silic rocks in which the iron oxides are present in small amount (up to about 2 per cent), but have not been separated, and which are otherwise so complete as to fall under 1.

3 applies to analyses in which the main constituents, including both oxides of iron, have been determined, but not TiO_2 , P_2O_5 , Cl , etc. (or the minor constituents), unless minerals rich in these are so abundant, or, as regards TiO_2 , the rock is so femic, as to make their estimation of the same importance as that of the main constituents. 3 also includes analyses of rocks low in iron oxides, in which these have not been separated, but which are otherwise complete according to the requirements of 2.

4 is to be assigned to analyses of all rocks except those very low in the iron oxides when these oxides have not been separated, when the alkalies or other constituents are determined by difference from 100 per cent, when the alkalies are not separated, when

any constituent of the first importance is not determined, when the analysis has been made of ignited material (not including drying at 110°), or when it is given, without the original figures, as having been recalculated on a water or carbonic-acid free basis.

Under the working plan already described, one of these factors compensates for the other to a certain extent. Thus a less degree of completeness is compensated for by a greater degree of accuracy. We would then judge, for example, an analysis of rating A2 and one of rating B1 to be of about equal value for many purposes. This is, confessedly, only true within limits and must be used with judgment and with a recognition of its empirical character.

To express, then, the various ratings of equal value, we can employ five series of terms as follows: Excellent or first rate, good or second rate, fair or third rate, poor or fourth rate, and bad or fifth rate. Their meanings, in terms of the symbols chosen, will be seen in the subjoined table, ratings of the same value falling on the same horizontal line.

First rate (I).....	A1				Excellent.	} Superior.
Second rate (II)....	A2	B1	.....	.....	Good.	
Third rate (III)....	A3	B2	C1	.....	Fair.	
Fourth rate (IV)....	A4	B3	C2	D1	Poor.	} Inferior.
Fifth rate (V).....	{	B4	C3	D2	} Bad.	
			C4	D3		
				D4		

In other words, analyses of the rating A1—those that are perfectly satisfactory both as to accuracy and completeness—would be called "excellent" or "first rate (I)," the two terms being synonymous. An analysis to which is assigned the rating either A2 or B1 would be spoken of as "good" or "second rate (II)"; one with either of the three ratings A3, B2, or C1 would be called "fair" or "third rate (III)"; one with the rating A4, B3, C2, or D1 would be "poor" or "fourth rate (IV)"; and one worse than these would be "bad" or "fifth rate (V)."

In any case, it must be remembered that accuracy should count rather more than completeness, since often an approximate correction can be made for constituents not determined, as for TiO_2 and P_2O_5 affecting Al_2O_3 . Consequently, though of the same general rating, an analysis rated as A2 is worth rather more than one rated as B1, and those rated as A3, B2, and C1 should be similarly appraised in the order of merit.

As a mnemonic convenience it may be useful to note that, if the letter indicating accuracy in any rating be replaced by the figure representing its place in the alphabet, the sum of this figure and the figure indicating completeness will be one unit greater than the rating of the analysis. Thus in a first-rate analysis, of rating A1, the sum will be 2; in a second-rate analysis, of rating A2 or B1, the sum will be 3; in a

¹ Milch, L., N. J. B. B., 15, p. 111 (note), 1902.

² Washington, H. S., Chemical analysis of rocks, p. 30, New York, 1910.

third-rate one, of rating A3, B2, or C1, the sum will be 4. In the rating of fifth-rate analyses, however, the sum may be greater than 6, as for instance, in the rating D4, where it will be 8.

As will be seen presently, analyses of the first three ratings—that is, excellent, good, or fair—are worthy of use in petrological discussions, whereas those of the fourth or fifth rate—that is, poor or bad—are of little or no use. In order to be able to distinguish between the two it will be well to have some short terms expressing the difference. It is suggested, therefore, that excellent, good, and fair analyses be spoken of collectively as *superior*, and that poor and bad ones be called *inferior*.

It may be desirable to indicate a higher degree of accuracy or completeness than is generally implied by A and 1. Thus, though A will apply to the general run of excellently accurate analyses, we might wish to distinguish some of a still higher order, as the best of those which Drs. Hillebrand, Stokes, Steiger, and Mingaye have made. These may be distinguished by the use of A*. Similarly it may be useful to discriminate analyses having the completeness found in Hillebrand's analyses of the rocks of the Leucite Hills, in which everything possibly present has been determined, from those in which some but not all of the rarer constituents have been estimated. This discrimination would involve the use of 1*. A combination of A* and 1* might be called "perfect," the word being used subject to human limitations. There does not yet seem to be much need of this distinction, though it will undoubtedly be more needed in the future than a discrimination between degrees of badness.

It should be remembered that these ratings indicate the *general character* of an analysis. Some features may justify us in calling an analysis as a whole either poor or bad, and yet it will be of use in a limited way. Thus, the iron oxides may not be separated, or the common error may be made in regard to alumina and magnesia, so that the analysis must be rated as fourth or fifth rate, *taken as a whole*, yet the lime and alkalies, for instance, may have been correctly determined, as well as the silica, so that for purposes in which only these determinations are needed the analysis may be useful to this extent. But, notwithstanding this, in view of its evident errors, the analysis can not be regarded as satisfactory.

The question now arises as to what ratings are of practical use. Leaving out of account conditions such as those just mentioned, in which utility attaches to some single determinations, it may be held that, for general purposes, only first or second rate (excellent or good) analyses should be countenanced or used by petrographers. The high standard set by the chemists of the United States Geological Survey should be adopted by all, and the chemical side of

petrology should be established on as firm and satisfactory a basis as the microscopical.

At the same time an otherwise good analysis in which the more important of the minor constituents have not been determined, such as TiO_2 and P_2O_5 , may be of use for some purposes, as for the classification of the rock. Third-rate or "fair" analyses may therefore be considered usable, especially if of high rate as to accuracy, since in many of them approximate corrections may be applied for constituents which have not been determined.

Excellent, good, and fair (superior) analyses may therefore be considered usable, but poor or bad (inferior) analyses should be rejected in any inquiry or discussion, unless the only question at issue is the elucidation of a special point for which some of the reliable determinations may serve.

THE TABLES.

DIVISION INTO PARTS.

It was desired to arrange the analyses embraced in the collection according to the quantitative system of classification. For most analyses such an arrangement was perfectly feasible, but a critical study of all of them showed that only a part could or should be thus arranged. In a surprisingly large number the iron oxides, for example, had not been determined. Though this is of comparatively small importance in analyses of persalanes, where these constituents form only 1 or 2 per cent, it becomes a most serious matter in analyses of other classes of rocks. Indeed, if the iron oxides amount to more than about 2 per cent and are not determined separately it is generally impossible to classify the rock with certainty, for some assumption must be made as to the real state of oxidation of the iron, and this assumption may not accord with the facts.

If the iron is assumed to be present as ferric oxide alone, this must generally be calculated as hematite to find the norm, thus freeing an amount of silica equivalent to the ferrous iron, which will alter the relative amounts of the other minerals, changing lenads into polysilicate feldspar or olivine into hypersthene. On the other hand, if all the iron is assumed to be ferrous, which is the rule followed for the sake of uniformity, an amount of silica will be needed which would not be used if part of the iron were ferric, and this would have the reverse effect on the other normative minerals to that just mentioned. It will, of course, probably be equally at variance with the true composition of the rock to make any other intermediate assumption—for instance, that ferric and ferrous oxides are present in equal molecular amount, the iron being thus assumed to be only in the form of magnetite.

We are therefore compelled to reject nearly all such analyses for the purpose of classifying the rocks of

which they have been made, as has been already stated.¹ Along with them must go a large number in which it is certain that the alumina is much too high and the magnesia correspondingly low, or in which we know that there must be a very notable amount (several per cent) of TiO_2 , which has not been determined, and which consequently serves to raise the apparent amount of alumina. In these analyses the salic lime, and therefore the normative anorthite, will be too high and the classificatory position of the rock consequently false.

A very large number of analyses are obviously so bad in other respects that they are almost or wholly worthless. It is needless to cite examples, for they may be found throughout the whole of Part IV.

Analyses of tuffs and of rocks so badly decomposed that the analyses do not represent their original composition were also found in abundance. Though many of these are analyses of the highest ratings, yet they were obviously of no use for purposes of classification, and hence could not logically be correlated with analyses of massive or unaltered rocks.

Analyses of volcanic ashes offer a peculiar problem. In Professional Paper 14 they were relegated to Part II, on the ground that the ashes presumably undergo a sorting or winnowing in their progress through the air, so that their eventual composition as analyzed would be more or less adventitious and not be representative of that at the place of ejection. Further consideration and study of many analyses of ash, however, has led me to assign less weight to the influence of such a process, especially when the ashes are collected near the eruptive center, and consequently in this paper analyses of volcanic ashes are included in Part I if of superior quality, not obviously decomposed, and not collected very far from the place of eruption.

In Professional Paper 14 all the analyses were placed in two parts. Part I contained all the superior analyses (ratings I, II, and III) of fresh rocks and a few analyses of inferior quality or of rocks that were not quite fresh, which were inserted chiefly because they "were deemed to be of especial interest and importance or were almost the only examples available for illustrating the chemical and mineralogical composition of the divisions into which they seemed to fall." In Part II were placed the inferior analyses and analyses of altered rocks, tuffs, etc., even if of the highest rating, except the few admitted to Part I.

This arrangement seemed to be unjust to the makers of excellent or good analyses of altered rocks, for, though the rating symbols were given, the analyses were naturally associated with those which were bad. There were also included in Part II a number of analyses that were good as to most of the constituents, but that could not be classified because of the non-

determination of some one constituent, most often that of both iron oxides, though they were usable otherwise for many purposes.

It has therefore been decided to arrange the analyses in four parts, which will be constituted as follows:

In Part I are placed all the superior analyses of fresh rocks—those which are excellent, good, and fair—except those which can not be properly classified in the quantitative system because of the nondetermination of one constituent. It does not include analyses of any tuffs or of rocks which are more than very slightly altered (weathered or metamorphosed). In general the presence of more than about 3 per cent of water in an analysis has excluded it from this part, except analyses of evidently fresh glassy pitchstones and like rocks or of analcite rocks (such as monchiquites), where this mineral is considered to be of primary origin. Also, in general, the presence of one-half of 1 per cent or more of carbon dioxide has excluded the analysis from this part, except a few analyses in which calcite is apparently taken from surrounding limestones, as in some Ontario rocks, and in which it has been allowed for and not brought into the norm; or unless cancrinite is apparently primary. Analyses of rocks in the descriptions of which chlorite, epidote, zeolites, kaolinized feldspars, or other alteration minerals are mentioned as present in more than very small amounts are of course excluded. Analyses of volcanic ash are included, in general, if of superior quality, not obviously decomposed, and not collected very far from the volcano.

The number of analyses has increased so greatly that the qualifications for entering Part I have been much stricter than those required in Professional Paper 14, and a great many that were put in this part must now be sought elsewhere. On the other hand, a few have been transferred from Part II of the first edition to Part I of this. In spite of this increased strictness, almost every systematic division in Part I now contains several times as many analyses as before.

In Part II are placed the superior analyses—generally good or fair—which were not deemed to be properly classifiable in the quantitative system, because of the nondetermination of some one constituent. Most of them are placed here because of the nondetermination of one of the iron oxides, with analyses of a few of the more femic rocks in which TiO_2 was not determined. Analyses of the more femic rocks which do not show both iron oxides and titanium dioxide have been placed in Part IV. They are arranged in the order followed in Zirkel's *Lehrbuch*, somewhat modified to accord with Iddings's "Igneous rocks."

In Part III are placed the superior analyses of tuffs and of weathered or otherwise altered rocks and analyses of some ashes. When possible a reference is given in the last column headed "Remarks" to the analysis of the fresh form of the altered rock.

¹ Cross, Whitman, Iddings, J. P., Pirsson, L. V., Washington, H. S., *Jour. Geology*, vol. 10, p. 646, 1902; also *The quantitative classification of igneous rocks*, p. 190, 1903.

In Part IV are placed nearly all the analyses deemed to be poor or bad. This part and Part III embrace many analyses formerly placed in Part I.

BASIS OF ARRANGEMENT OF ANALYSES.

ATTEMPTED USE OF CURRENT PETROGRAPHIC SYSTEM.

When this collection was first started, more than 15 years ago, the analyses were classified according to the system of Rosenbusch. Generally the name given by the author to the rock was adopted, but many rocks seemed to me to have been wrongly named, so I took the liberty of renaming them, but put the author's name in brackets. As the collection progressed this renaming became frequent, as is by no means surprising in view of the loose and often contradictory principles, the subjective and qualitative character, and the vague definitions prevalent in the systems in vogue. It furnished a most striking illustration of their illogical, inconsistent, and unsatisfactory character, and was a most cogent argument against their continued use. It indicated, indeed, that there was in reality no one system to which one could turn for guidance, but that each petrographer had set up his own standards to some extent, made his own definition of many of the terms in use, or assigned his own limits to them, which might or might not correspond with those of others—in a word, had partially made his own classification and nomenclature. Each was a hodgepodge, made up of bits taken from this or that authority or evolved from the individual author's own ideas. There was seldom if ever any broad principle which one could apply throughout, and the result was a clashing of principles, inconsistencies everywhere, and a lack of harmonious and even development. If a petrographer had been working on a certain group of rocks his classification in that group would be very detailed, whereas in other groups the names he gave would be few, and the classification of some authority would be used with no critical estimate of its applicability and no thought of its logical consistency with the other more detailed and familiar parts of the scheme.

Everyone has recognized this state of affairs more or less clearly; but it is forced most strongly upon one who makes a large collection of rock analyses and a careful comparison between the descriptions and analyses and the names applied to rocks by the different writers.

Roth¹ has expressed somewhat similar views, and is inclined to think that no one system will ever receive general acceptance. I am less pessimistic, for I

regard the lack of any universally adopted system of classification as due less to difficulties caused by the characters of the rocks than to the general lack of appreciation of the necessity for logical and consistent principles, and to a natural disposition to patch up the old rather than to substitute something totally new, even if better.

ADOPTION OF THE QUANTITATIVE SYSTEM.

While this early collection was being made I became interested, with Cross, Iddings, and Pirsson, in the working out of the system of classification and nomenclature of igneous rocks which has been proposed by us. In the course of this work the growing collection of analyses was continually referred to, the modes of many of the analyses were calculated, and they were rearranged from time to time to test the various propositions or suggested lines of classification until agreement with any system at present in use was lost.

After having arrived substantially at the system of classification which we finally adopted, we saw that the collection if arranged in accordance with this system would not only be its best exponent, but would be an indispensable foundation for purposes of nomenclature, the consideration of which was taken up only after the main features of the classification had been disposed of.

The collection was therefore finally made as complete as possible and arranged in accordance with the new system,² and we decided to publish it in that form. The same course has been followed in this edition.

FEATURES OF THE TABLES.

Geographic arrangement.—In each of the subranges in Part I and in each of the rock groups in the other parts the arrangement is geographic. The primary step is by continents, North and South America coming first, then in order, Europe, Africa, Asia (including the Malay Archipelago), Australia and New Zealand, Polynesia and the scattered islands of the Pacific, Indian, and South Atlantic oceans, and finally Antarctica. The States and minor divisions are arranged in zones running from north to south (except in Germany, where it is from west to east), and in a rough way localities have the same general order. At any one locality the analyses are arranged according to decrease in silica, or, if this should be the same in two analyses, according to decreasing alumina.

The general scheme is shown in the annexed list. The scattered islands are not included. Though this order is followed in general, yet in places it has been inadvertently departed from.

¹ Roth, J., *Chem. Geologie*, vol. 2, p. 41, 1883. Cf. Cross, Whitman, *Jour. Geology*, vol. 10, p. 473, 1902.

² This classification is described in Appendix 1.

NORTH AMERICA.

Greenland, etc.
 Eastern Canada:
 Labrador, Newfoundland, Maritime Provinces, Quebec, Ontario.
 Eastern United States:
 Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, Virginia, Kentucky, North Carolina, South Carolina, Tennessee, Georgia.
 Central and Western United States:
 Michigan, Wisconsin, Minnesota, Missouri, Arkansas, Oklahoma, Texas, North Dakota, South Dakota, Montana, Yellowstone National Park, Wyoming, Idaho, Colorado, Utah, New Mexico, Arizona.
 Pacific Coast:
 Alaska, British Columbia, Washington, Oregon, California, Nevada.
 Mexico.
 Central America.
 Panama (including Canal Zone).
 West Indies.

SOUTH AMERICA.

British Guiana.
 Colombia.
 Ecuador.
 Peru.
 Bolivia.
 West Argentina.
 Chile.
 Patagonia.
 Brazil.
 Paraguay.
 East Argentina.

EUROPE.

Iceland.
 Great Britain:
 Northern Islands, Scotland, England, Wales, Cornwall, Ireland
 France, Corsica.
 Spain.
 Portugal.
 Azores.
 Spitzbergen.
 Norway.
 Sweden.
 Finland, Kola.
 Germany:
 Westphalia, Rhineland, Alsace-Lorraine, Hesse, Baden, Württemberg, Prussia, Thuringia, Bavaria, Saxony, Silesia.
 Austria-Hungary:
 Bohemia, Moravia, Lower Austria, Galicia, Hungary, Bosnia, Tyrol.
 Switzerland.
 Italy:
 Lombardy, Piedmont, Emilia, Tuscany (Elba), Rome, Campania, Apulia, Sardinia, Sicily, Pantelleria.
 Russia:
 North Ural Mountains, South Ural Mountains, South Russia, Caucasus.
 Balkan States.
 Greece, Archipelago.
 Asia Minor.

AFRICA.

Algeria.
 Morocco.
 Madeira.
 Senegal.
 French Guinea.

Nigeria.
 Kamerun.
 French Kongo.
 Egypt.
 Kordofan.
 Eritrea.
 Somali (Aden).
 Abyssinia.
 British East Africa.
 German East Africa.
 Madagascar (Reunion).
 Rhodesia.
 Transvaal.
 Natal.
 Cape Colony.

ASIA.

West Siberia.
 Persia.
 Turkestan.
 East Siberia, Kamchatka.
 Manchuria.
 China.
 Chosen (Korea).
 Japan.
 Indo-China.
 India.
 Philippine Islands.
 Malay Archipelago:
 Borneo.
 Celebes.
 Sumatra.
 Java, Flores, etc.
 Moluccas.
 Papua (New Guinea).

AUSTRALASIA.

Queensland.
 New South Wales.
 Victoria.
 South Australia.
 Western Australia.
 Tasmania.
 New Zealand.

In this connection attention may be called to the striking gaps in our knowledge of the chemistry of the igneous rocks of various parts of the globe. Though some countries have been very thoroughly studied in this way and are represented by numerous superior analyses, others have been much neglected or are quite unrepresented. The long line of gigantic Andean volcanoes show an inadequate number of analyses, and most of these of not very satisfactory quality. Other very well known regions, of which the Eifel, Siebengebirge, Schemnitz, and Etna may be mentioned, are represented by few analyses other than those of early date, so that we know little about them chemically. The vast expanses of India, Tibet, and China are represented by a surprisingly small number of analyses, and few of these are very good. Not a single analysis was found of the igneous rocks of such large and well-known islands as Cuba, Porto Rico, and Jamaica.

Numbering of analyses.—For purposes of reference each analysis is numbered, the numbering beginning

anew with each subrang in Part I and with each general group in the other parts. In referring to any given analysis the number will be used with the symbol, not with the subrang name, as in the first edition. The number is repeated on the right-hand page.

Rating of analyses.—With the number is given the rating assigned to the analysis by me, according to the principles already described. The letters and numbers which indicate the degree of accuracy and completeness are given, with a Roman numeral to express its general rating, as shown on page 25. Thus, A 1. I means that the analysis is excellent or first rate, being highly accurate and complete, A 3. III that it is fair or third rate, being of high accuracy, but only moderate as to completeness.

The rating of some analyses has been difficult. The criteria for judgment outside of the analysis itself are often lacking or insufficient, but I have endeavored to be judicial and unprejudiced, and the rating generally expresses my frank opinion of the value of the analysis. Where I have had serious doubt as to the accuracy of the work, yet have been unable to assign any definite reason for the doubt, I have settled it in favor of the analyst, so that I look with suspicion on some analyses that are here rated as superior and that appear in Part I, though I have no positive proof of their inferiority. An interrogation point (?) after a symbol indicates that the rating assigned is one degree higher than that which I suspect it deserves.

I may repeat that each individual analysis has been the object of careful consideration and that many of the ratings given in the first edition have been revised in the light of increased knowledge, so that I feel confident of the correctness, according to the standards adopted, of nearly all of them.

Time was lacking for a critical study of the number of analyses assigned to each of the several ratings, and of the progressive improvement in quality—such a study as was made for Professional Papers 14 (p. 65) and 28 (p. 15). This study will be made, however, and will form the subject of a separate paper. A general survey indicates, as would be expected, that the improvement since 1900 has been steady, so that probably 75 or possibly 80 per cent of the analyses made since then are superior, against the 65 per cent of those made between 1884 and 1900.

Constituents.—The main constituents are given in horizontal rows on the left-hand page. This is the arrangement employed by Roth and by Osann, and it was adopted here rather than an arrangement in vertical columns, because it facilitates reference and for typographical reasons. With the chief constituents are included TiO_2 , P_2O_5 , and MnO , since these are in general the most important of the minor constituents, and the two former are present in all excellent and good analyses and in many that are rated fair.

CO_2 and BaO have been transferred to the column headed "Inclusive," partly for spatial reasons, partly not to magnify their importance, and partly because most of the rocks that contain CO_2 are not fresh and have been transferred to Part III.

In analyses in which the iron oxides are not separately determined, the figures are given under Fe_2O_3 or FeO , according to the statement of the original analysis. When, however, there is no indication as to this point in the original, the two oxides being connected by a bracket, I have assumed that they really represent Fe_2O_3 , as this is the form in which they are weighed. This may not always correspond with the facts, but their nonseparation greatly lessens the value of the analysis, and this seemed the most reasonable assumption to make in order to calculate the norm, so that this course has been uniformly followed in the absence of information to the contrary.

When they are so stated in the analysis, combined and hygroscopic water are both given, but no attempt has been made to discriminate between the various temperatures at which the hygroscopic water has been determined. Usually this is 110° , but often 100° or 105° , and occasionally 120° or 130° . The difference in the result is so small and unimportant that it seemed to be not worth while to indicate the exact temperature.

Nor is indication given as to whether the water has been determined directly or as loss on ignition. This is a defect in the collection which is regretted and which would have been corrected were time and opportunity at my disposal. It arose from the fact that a very considerable number of analyses had been collected before publication was decided on, and in these the discrimination had not been made. As a matter of uniformity, the same course was adopted in the analyses collected subsequently. It may also be remarked that most analyses as originally published give no hint as to how the water was determined, so that even if special attention had been paid to this point, decision would have been impossible as to very many analyses.

The molecular numbers of the main constituents are given below the figures showing percentages. Those given in the first edition have been gone over and corrected where necessary, and all those of other analyses have been calculated by me, even though they were given by other authors. In calculating these, the tables given in the publication of the quantitative system¹ have been used. In taking the figures from these tables, when the second decimal of the percentage was 4, 5, or 6, and there was a gap of two units between the tabulated ratios above and below, the figure chosen was that midway. Thus, with 4.84, 4.85, or 4.86 per cent of CaO , the ratio given is 0.087.

¹ Cross, Whitman, Iddings, J. P., Pirsson, L. V., Washington, H. S., The quantitative classification of igneous rocks, pp. 237-246, 1903. See also Appendix.

If the iron oxides have not been separated and are stated in the analysis as Fe_2O_3 only, the molecular number of the ferric oxide as stated is given, and the equivalent of this number reckoned as that of FeO is given in parentheses and used in calculating the norm. If the alkalis are in excess of Al_2O_3 —that is, if normative acmite is present—the appropriate molecular amount of Fe_2O_3 is given under this head and the rest of the iron calculated as FeO . It may be noted that the molecular number of FeO equivalent to Fe_2O_3 is obtained by doubling that of the latter.

The minor constituents, except TiO_2 , P_2O_5 , and MnO , are placed in the column headed "Inclusive" and their molecular numbers are omitted.

In checking the summations a number of errors in the original figures were detected. Each of these errors has been corrected by giving the proper summation above that given in the original paper, which appears below in parentheses.

Specific gravity.—The specific gravity of the rock is given if it could be ascertained from the original paper. The temperature at which it was determined is generally omitted, as it is but rarely of value.

Symbols.—The symbol which represents the magmatic position of each rock¹ has been given in Part I, with certain modifications introduced later² to indicate intermediate and transitional positions. I have introduced a further refinement, the symbol ". In the original publication parentheses () were used to indicate a transitional magma. This device is retained here. The symbol ' was used to indicate that the magma was intermediate, this term including both transitional magmas and those that fall between these and those that stand in a central position.³ For indicating the distal position no provision was made, though Iddings⁴ uses ' uniformly for this purpose. As this is a subdivision of the intermediate position represented by ', the secondary symbol ", used for seconds or inches, seems appropriate, and I have used it consistently in this sense in several recent papers, though unfortunately without explanation.

For rocks of persalane, dosalane, dofemane, and perfemane classes only the symbol of the preponderant salic or femic portion is given, as the other is subordinate or negligible.⁵ In those of the sulfemane class the symbol for the salic portion is given first in full detail, and below (in italics) that of the femic portion, which is about equal in weight to the other. If the position is central in all respects the symbol $\odot$ is

added, lack of it implying that only the *general* symbol for the subrang or subgrad is intended.

Norm.—The norm is given for each analysis in Part I, which includes all those that have been classified according to the quantitative system. As has been stated, the norm of every analysis which is found in the first edition, and which is here found in Part I, has been recalculated by me, and carried out to the second place of decimals, which is generally the significant figure. A number of errors in norms have been thus detected, for in the old norms the stated amount of magnetite frequently included the ilmenite, and MnO was also not generally reckoned in with FeO . The correction of these errors has necessitated a few changes in classification position.

The norms of all other analyses here included have also been calculated by me, no norm being accepted as published. Here, again, some errors have been detected, some of them very serious, and generally due to a misunderstanding of the principles on which the calculation is based.

The norms have been scrutinized in the work of copying the analyses in the manuscript and many have been collated with those given by Iddings,⁴ so it is believed that few errors have been made and that they can be accepted as here given, though it is too much to hope that they are all free from error.

In calculating the norm, molecular amounts down to 0.001 have been recognized, especially of P_2O_5 and MnO , a lower percentage than 0.10 of the former and 0.07 of the latter having been neglected. The molecular amount of MnO has been reckoned in with that of FeO and, when necessary (as when hematite is present), has been assumed to form magnetite and ilmenite. BaO and SrO have been reckoned in with CaO when they amount, molecularly, to 0.002 or more. When the rock contains cancrinite CO_2 has been calculated as Na_2CO_3 , and this is regarded as salic.

Cl has been calculated as NaCl (halite) and SO_3 as Na_2SO_4 (thenardite), in accordance with the modification of the quantitative system proposed in 1912.⁶ In accordance with a later modification, based on researches in the Geophysical Laboratory, and for other reasons,⁷ the åkermanite molecule, $4\text{CaO} \cdot 3\text{SiO}_2$, has been replaced by the calcium orthosilicate molecule, $2\text{CaO} \cdot \text{SiO}_2$. The new equations used for the calculation will be found in the appendix. Changes in position due to this modification are very few and of slight importance. Great care has been exercised in distributing FeO and MgO in the same proportions between diopside, hypersthene, and olivine, a slide rule proving very useful for this.

¹ Cf. Iddings, J. P., U. S. Geol. Survey Prof. Paper 18, pp. 67, 72, 1903; Washington, H. S., U. S. Geol. Survey Prof. Paper 28, p. 13, 1904.

² Cross, Whitman, Iddings, J. P., Pirsson, L. V., Washington, H. S.: Jour. Geology, vol. 20, pp. 553-557, 1912.

³ This position, between central and transitional, may be called *distal*, a term slightly modifying the meaning suggested elsewhere (Am. Jour. Sci., vol. 36, p. 583, 1913).

⁴ Igneous rocks, vol. 2, 1913.

⁵ Lack of a subscript roman numeral after the roman numeral denoting class implies that the subclass is I.

⁶ Cross, Whitman, Iddings, J. P., Pirsson, L. V., and Washington, H. S., Modifications of the quantitative system of classification of igneous rocks: Jour. Geology, vol. 20, p. 557, 1912.

⁷ Washington, H. S., The calculation of calcium orthosilicate in the norm of igneous rocks: Washington Acad. Sci. Jour., vol. 5, p. 345, 1915.

In stating the norm the salic and femic molecules are kept separate, and are denoted by the symbols adopted for them. A list of all symbols used is given in the table of abbreviations on page 46.

Locality.—The names of localities are those given by the author, though lack of space necessitated the omission of some details, such as distances and quarry names. With some exceptions, such as the use of the name commonly accepted in English, the names of countries and localities are those which were in use prior to the present war. The name of the country is omitted if the State, province, or district is given and is well known, though it is inserted if the locality is small or little known, and if the province or other geographic division is not furnished by the original paper. The endeavor has, however, been made to look up doubtful localities, Stieler's Atlas (1906) being used, so as to determine the province or district.

The orthography of the geographic names conforms with the decisions of the United States Geographic Board so far as they extend. When these were not available, in case of doubt, Lippincott's Gazetteer (edited by Heilprin, 1906) was the accepted authority. I must disclaim responsibility for the omission of the apostrophe in such names as Pikes Peak, Lands End, and St. Davids Head, which is in accordance with the ruling of the United States Geographic Board. I may add that I thoroughly disapprove of the omission as grammatically incorrect. With the exception of ä, ç, é, è, ñ, ö, and ü, diacritical marks are omitted from letters both in locality names and in the references.

Analyst.—The name of the analyst precedes that of the author of the paper, because this is a collection of analyses and because the analyst is a useful factor in rating analyses. When known, the initials of the Christian names are inserted, but, as some were not given by the author and were unknown to me they are perforce omitted. If the analyst is quite disregarded by the author I have had to rest content with the phrase "not stated."

Reference.—The aim has been, in the column headed "Reference," to indicate the author by whom and the place where the analysis was first published. Subsequent publication, whether by the same author or by others, has been as a rule disregarded. Many analyses, however, made for authors who are connected with Government surveys, notably the United States Geological Survey, have been first published in papers appearing in unofficial journals or proceedings of societies, and only subsequently in official reports. For such analyses there is given in the column headed "Reference" the place of the first (unofficial) publication, and under "Remarks" is noted the place of the first official publication. This seems just to the Survey, for the analyses were made by official chemists.

In general, such publications as "Report of work done," "Summary of progress," even though official, in which the analysis appears without a description of the rock, are neglected unless this is the only reference available. In the case of analyses made by the chemists of the United States Geological Survey and published in unofficial journals but not in official publications prior to 1914, only the place of first publication is given, not Bulletins 148, 168, 228, 419, 591 of that Survey, in which they may appear. Reference to one of these five bulletins indicates that the analysis has been found only in that bulletin or elsewhere as a citation from it. In such cases the "author" cited is the petrographer who furnished the description for the bulletin.

The page number¹ given in the reference is that on which the analysis occurs, not that on which the paper commences. The date given is the year of publication, not the year for which the report is issued, this being placed in parentheses (). In dissertations the university name is given, not that of the place of publication. A number of analyses were found in the Referate of the Neues Jahrbuch, which have been published in papers inaccessible to me, and which would, therefore, otherwise have escaped incorporation in the collection. The pages on which these analyses appear are not mentioned in the Referate of the Jahrbuch, so I give only the name of the author and a reference to the Neues Jahrbuch.

I have, unfortunately, been obliged to omit many analyses that have appeared in journals published in languages with which I am unacquainted, notably Russian, Bohemian, Magyar, and Japanese, for the impossibility of understanding the context left me in ignorance as to the occurrence or character of the rock. I have to thank Dr. H. Backlund for his help in obtaining a number of analyses of Russian and Siberian rocks through his kindness in translating the Russian text. I must also acknowledge the assistance of Dr. E. W. Posnjak, of the Geophysical Laboratory, in a similar way. To Dr. S. Kozu I am indebted for a series of analyses of Japanese rocks published about 1884.

In the interest of the general scientific world, whether geological, zoological, botanical, physical, chemical, or other, I desire to register a protest against the publication of scientific matter in such languages, whether by official enforcement or not, even though it be ameliorated by the addition of an abstract in one of the languages—English, French, German, or Italian—with which every scientific man is supposed to be acquainted. National pride or other feelings should not impose such extra and unnecessary burdens on the man of science. For my own part I am forced to regard analyses or other

¹ A page number in parentheses () is that of a separate, not that of the original pagination.

scientific data that are published only in such languages, which are unknown to the great body of scientists, as so nearly unavailable and lost to science that they may be considered as unpublished.

The names of organizations and journals are given in abbreviated forms, which have been made as concise as seemed consistent with clearness, and it has been an aim to establish some standard forms of abbreviation for the use of petrographers. In this I have been aided by, and have partially followed, the lists in Dana's *System of Mineralogy* (1892) and the *Geologisches Centralblatt* (I, 1901), though I have modified their abbreviations in many particulars, chiefly in the direction of still further condensation. A list of the abbreviations generally adopted will be found on pages 45-46.¹

Rock name.—The name of the rock which has been designated by the author of a paper cited is given under the heading "Rock name." A few minor changes have been made in these names, notably the replacement of *eleolite* or *nepheline* by *nephelite*, and the occasional shortening of some names composed of those of several minerals, as *pyroxene-andesite* for *hypersthene-augite-andesite*. A few different names that have been given to the same rock by others appear either under this heading or in the last column.

Remarks.—The column headed "Remarks" contains information for which there is no place elsewhere in the tables or remarks on certain features of the analysis of the rock. Here, also, attention may be called to features of the analysis which may be regarded with suspicion. This information is of necessity stated very concisely, or it may be omitted, since any discussion is out of the question in the small space available. An analysis that has appeared in the first collection is indicated here by the phrase "In W. T.," with page number, so that its earlier and present positions may be readily compared. If the date of the analysis is prior to 1901 and the analysis was not included in the first collection, the phrase "Not in W. T." is used.

COMMENTS ON NORMATIVE NAMES.

Since the publication of the first edition a considerable number of new names have been given to various subranges and other divisions of the quantitative system, and a few more have been given and changes made in the present work. There has been some duplication of names, the systematic position of some newly named divisions has been incorrectly calculated, the specimens of rock on which other names were based have not been fresh, or the analyses have been inferior.

A short list of new names was published in 1912,² but without extended comment. In the original publication of the quantitative system only a few suggestions were made as to the formation of new systematic names. It may therefore be appropriate to discuss here briefly the general principles of nomenclature and the laws of priority applicable to the acceptance or rejection of new names. Comments will also be made on some systematic names, including some given in the original publication and some proposed subsequently. This matter has been discussed with the other authors of the quantitative system, and the views here expressed in general meet with their approval. It may be confessed that the subject is in places somewhat complex and that some inconsistencies may possibly appear in the choice of names in the present compilation.

The rules that were finally suggested for adoption and that are followed in the present work are stated below:

1. Names based on rocks which are obviously or have been shown to be nonigneous or metamorphic, or are certainly or possibly of meteoric origin, have no standing. This rule excludes such names as *kodurose* and *boiranose*, *sitkose*, and many names proposed by Summers, based on *australites*, *moldavites*, and other possibly or probably meteoric but not certainly igneous bodies. The subrang names applied to meteorites by Farrington,³ though appropriate for them, should not be applied to corresponding *terrestrial* igneous rocks.

2. Names should not be applied to divisions regarded as negligible in the original publication of the quantitative system. This applies especially to subranges of percalcic rangs, such as *caledonose* and *ouenose*.

3. If the assigned position of the rock on which the divisional name is based is incorrect because of faulty calculation of the norm or because of other errors, the name is to be regarded as doubtful. This has been found to be the most frequent cause of uncertainty in determining questions of nomenclature, and a certain amount of latitude must be left to the systematist in accepting or rejecting a name so assigned. If the assigned position is not already preempted, and no very serious error of calculation has been made, the name may be allowed to stand as originally applied. Such a case is that of *palisadosé* or of *kakoulimose*. If, on the other hand, no very serious error in calculation has been made, and the correct position is not named, the new designation may be transferred to the division to which it properly applies, as was the name *pianarose*. If, however, a very serious error has been

¹ Owing to the considerable length of time over which the writing of the manuscript extended the use of the abbreviations is, unfortunately, not perfectly uniform.

² Cross, Whitman, Iddings, J. P., Pirsson, L. V., Washington, H. S., Modifications of the quantitative system of classification of igneous rocks: *Jour. Geology*, vol. 20, pp. 550-561, 1912.

³ O. C. Farrington, *Field Mus. Pub.* 151, 1911.

made in the assignment, as by inadvertently stating that a rock is dopotassic when it is dosodic, and when its proper position is already named, the new name should be dropped. Craigmontose is a case in point. The names to which rule 3 applies are the most numerous, those which have caused most perplexity, and which have given rise to most inconsistencies. The attempt has been made in this publication to treat them with justice and with due regard to the stability of the terminology of the system, and the prevention of confusion, in so far as possible, to future systematic terminologists.

4. A new name should not be based on the analysis of a rock which is obviously not fresh, however good the analysis may be. Mainare, lermontose, and washingtonose are cases in point.

5. A name based on an analysis which is clearly seriously inferior, either in accuracy or completeness, as to the major constituents, is not entitled to recognition. Taurose and vulcanose are examples.

6. The application of names whose roots are taken from small localities to the larger divisions, such as class or subclass, is to be deprecated, as well as of names whose roots are likely to be misinterpreted. Examples of these are gorduniare, rhodare, and piedmontase.

7. Names should not be based on rocks that occupy a transitional position, that is, very close to the border of another division. This rule applies to many names already published within the original tabulation and subsequently, as study of the symbols given in the following pages will abundantly show. They have been allowed to stand, but it is to be hoped that in the future names thus based will not be bestowed. On the other hand, examination of the magmatic symbols in Part I will show the extreme rarity of rocks that are central as regards all the divisions. In practice, therefore, a name may be based on a rock whose symbol includes distal (cf. p. 31) signs ("), but not transitional, indicated by parentheses ().

8. The generally accepted laws of priority, such as are enunciated by Dana in his System of Mineralogy, are supposed to hold good as to duplicated names.

9. Other things being equal, it is preferable to base the name of a systematic division on the name of a rock according to that given it in the qualitative system, if such a name be available.

In Part I of the present edition, and in the tables given in Appendix 2, will be found, in their appropriate systematic positions, all the names which have been proposed up to the time of its compilation, and which are deemed worthy of acceptance under the rules stated. A number of these names will now be discussed. All known names have been collected and collated, and the questions of priority and of the acceptance or rejection of names have been discussed, so it is hoped that the present work may serve the

future terminologist as a definitive point of departure.

In the following pages of commentary, which embraces only those names which seem to require comment, names that have been rejected are printed in *italics* and those that are recognized as valid are printed in SMALL CAPITALS. Names used in Part I but which are not discussed here are accepted.¹

I. 2. 1. 1-2. *Radomiltzose*. (H. Summers, 1909). Name rejected because based on the analysis of a moldavite, possibly of meteoric origin. The subrang is here called ARIZONOSE from a quartz dike rock (arizonite) to be described by Spurr and Washington.

I. 2. 1. 3. *CARDIFFOSE* (Adams and Barlow, 1910). Name objectionable, being based on a "nodule in granite," but accepted.

I. 2. 2. *Moldavase* (H. Summers, 1909). Rejected as based on analyses of moldavites and also as covered by DARGASE (C. I. P. W., 1902).

I. 2. 2. 1-2. *Moldavose* (H. Summers, 1909). Cf. I. 2. 1. 1-2.

I. 2. 3. *Budweisase* and I. 2. 3. 1-2. *Budweisose* (H. Summers, 1909). Cf. I. 2. 1. 1-2.

I. 3. 1. 4. *Taurose* (H. S. Washington, 1904). Name badly chosen as based on an inferior analysis of a keratophyre of the Crimea (Tauric Chersonesus). Replaced by TORDRILLOSE.

I. 3. 3. *Piemanase* and I. 3. 3. 3. *Piemanose* (H. Summers, 1909). Cf. I. 2. 1. 1-2.

I. 3. 3. 4. *SUSQUEHANNOSE* (F. Bascom, 1905). Has priority over *orangose* (Harwood and Wade, 1906), which really falls in I. 3. 2. 4.

I. 3. 3. 5. *Vulcanose* (C. I. P. W., 1902). Rejected. Name objectionable as based on an inferior analysis.

I. 5. 1. 1. *HETTOSE* (C. W. Wright, 1915). Erroneously applied to I. 5. 1. 2.

I. 5. 1. 2. *Hettose*. Cf. I. 5. 1. 1.

I. 5. 2. 4. *LARVIKOSE*. Changed from original *larvikose* to conform with Brögger's spelling of *larvikite* (Nyt Mag., vol. 44, p. 124, 1906).

I. 5. 3. *PIEDMONTASE* and I. 5. 3. 4. *PIEDMONTOSE* (Watson and Taber, 1913). Name objectionable as implying a rock from Piedmont, Italy.

I. 5. 5. 4-5. *Caledonose* (Lacroix, 1911). Rejected under rule 2, subrang name not needed.

I. 6. 1. 5. *MARINUPOLOSE* (C. I. P. W., 1902). Analysis in United States Geological Survey Professional Paper 14 (p. 213) inferior, but name justified as the typical marinupolite would fall here.

I. 6. 2. 3. *Procenose* (H. S. Washington, 1906). Name objectionable as based on a transitional rock, which really falls in I. 5. 2. 3. Rejected.

I. 6. 2. 4. *VIEZZENOSE* (C. I. P. W., 1902). Name poorly chosen. Predazzose would have been better.

I. 7. 1. 2. *Craigmontose* (Adams and Barlow, 1909). Rejected. By error called dopotassic when really dosodic. Rock falls in I. 7. 1. 4 (*Laugenose*).

¹ Additional comments will be found on p. 46.

II. 3. 3. 1. *Urallaoase* (H. Summers, 1909). Rejected as based on a moldavite of possibly meteoric origin. Cf. I. 2. 1. 1-2.

II. 3. 3. 4. *Sitkose* (C. I. P. W., 1902). Rejected as based on the analysis of a grauwacke (A. Knopf, pers. com.).

II. 3. 5. 0. *Gordonase* (C. I. P. W., 1902). Rejected, rock not fresh.

II. 5. 1. 3. *ILMENOSE* (C. I. P. W., 1902). Name objectionable because suggesting Ilmen Mountains and ilmenite.

II. 5. 2. 1. *Boiranose* (L. L. Fermor, 1912) and II. 5. 3. 1. *Kodurose* (L. L. Fermor, 1912). Both of these are rejected as based on more or less hypothetical analyses of metamorphic rocks.¹

II. 5. 3. 2. *AURUNCOSE* (H. S. Washington, 1906). Has priority over *Lincolnose* (Ida Ogilvie, 1907) and *baquiose* (W. D. Smith, 1907), which latter was applied to a rock which really falls in II. 5. 3. 3.

II. 5. 5. 5. *Luzonose* (W. D. Smith, 1907). Rejected under rule 2, subrang not needed. Analysis of diorite inferior.

II. 6. 1. *LARDALASE* and II. 6. 1. 4. *LARDALOSE*. Changed from original *laurdalase* and *laurdalose*. Cf. I. 5. 2. 4 above.

II. 6. 2. 5. *Neponsetose* (F. Bascom, 1912). Rejected as based on an incorrectly calculated norm and inferior analysis.

II. 7. 1. *Chibinase* and II. 7. 1. 4. *Chibinose* (V. Hackman, 1905). Suggested to replace *LUJAVRASE* and *LUJAVROSE* (C. I. P. W., 1902). Rejected on basis of priority of the latter, and because the type rock was originally called *lujavrite*.²

II. 7. 2. *VULTUROSE* and II. 7. 2. 4. *VULTUROSE* (C. I. P. W., 1902). Based on an old analysis, but some Vulture haunophyre would fall here. A new analysis of a type specimen falls in II. 8. 2. 4.

II. 8. 2. 2. *VESUVOSE* (C. I. P. W., 1902). This name should have been applied to II. 7. 2. 2 *BRACCIANOSE*, in which most of the analyses of Vesuvian lavas fall.

II. 8. 2. 4. *MELFOSE*. New name, represented by an unpublished analysis of typical haunophyre of Melfi, Monte Vulture.

III. 3. *ATLANTARE* (C. I. P. W., 1902). Name very badly chosen and objectionable. Represented only by duplicate analyses of one small specimen. Hibernare would have been better, as Ireland is not represented.

III. 5. 1. 4. *PIENAROSE* (H. A. Brouwer, 1910). Name incorrectly assigned to III. 6. 1. 4 through erroneous calculation.

III. 5. 5. 4-5. *Ouenose* (A. Lacroix, 1911). Name rejected under rule 2, subrang name not needed.

III. 6. 1. 2. *Washingtonose* (F. L. Ransome, 1908). Name rejected, as the rock is not fresh.

III. 6. 1. 4. *PILANDOSE* (Washington, 1914). New name to replace Brouwers's *pienarose*, incorrectly applied, which really falls in III. 5. 1. 4.³

III. 6. 2. 2. *KAJANOSE* (H. A. Brouwer, 1909). Name omitted from list of C. I. P. W., 1902.

III. 6. 4. *Amargase* and III. 6. 4. 4-5. *Amargose*. (F. L. Ransome, 1910.) Names rejected, as the rock analyzed is not fresh (cf. p. 921).

III. 6. 4. 4-5. *PAPENOSE* (Lacroix, 1910). The rock analyzed falls in IV. 2. 2. 2. 2 (*MONTREALOSE*, Adams) but is very close to the border of Class III (cf. p. 721), so that *papenose* is accepted in place of *amargose* (F. L. Ransome, 1910), based on a weathered rock.

III. 8. 1. 5. *Tavose* (V. Hackman, 1905). Rejected as based on a very bad analysis (cf. p. 1133).

In the dofemane and perfemane classes, in accordance with a recent publication,⁴ the rangs are now based on the ratio $MgO + FeO + Na_2O'' : CaO$, instead of on the ratio $MgO + FeO + CaO'' : Na_2O''$, as originally used.

In the present work, therefore, in these classes the rang name is consistently that of the earlier section of rang name (with the "i" omitted), which had the same name root.

IV. 1. 2. *QUEBECIARE* (J. A. Dresser, 1909). Has priority over *Hawaiiare* (R. A. Daly, 1911).

IV. 1. 2. 2. 2. *PALISADOSE* (J. V. Lewis, 1907). Lewis's olivine diabase falls transitionally in IV. 1. 2. 1. 2 (*HILOSE*, R. A. Daly, 1911), but the name is accepted as having priority over this and *hudsonose* (G. S. Rogers, 1911) and *thiose* (A. Lacroix, 1911), the last falling in IV. 1. 2. 2. 2.

IV. 2. 2. *PAULIARE*, IV. 2. 2. 3. *PAULASE*, and IV. 2. 3. 2. *PAULOSE* (C. I. P. W., 1902). In original publications incorrectly spelled *paoliare*, *paolase*, and *paolose* (p. 583).

IV. 2. 3. 3. 2. *NAKETOSE* (A. Lacroix, 1911). Analysis incorrectly placed by Lacroix. In *uvaldose*, IV. 2. 3. 2. 2. *Tulamose* (C. Camsell, 1913) is rejected, as serious errors were made in the calculation, the rock falling in IV. 2. 2. 2. 2, and *naketose* has priority.

IV. 3. 3. *UTEIARE* (E. S. Bastin). Unpublished.

IV. 3. 3. 2. *ELDORASE* and IV. 3. 3. 2. 3. *ELDO-ROSE* (E. S. Bastin). Unpublished.

IV. 4. 1. 1. *ARAPAHASE* and IV. 4. 1. 1. 4. *ARAPAHOSE* (Washington and Larsen, 1913). In the original publication (p. 452) the symbol of arapahose was incompletely given as IV. 4. 1. 1, the subrang symbol having been omitted.

IV. 5. *CORDILLERARE* (E. S. Bastin). Unpublished.

IV. 5. 2. 1. *POMERASE* and IV. 5. 2. 1. 4. *POMEROSE* (E. S. Bastin). Unpublished.

V. 1. 3. *SAXONIARE* (H. S. Washington, 1916). Named in recognition of the name *saxonite* of Wads-

¹ Cf. Cross, Whitman, Jour. Geology, vol. 22, p. 791, 1914.

² Brogger, W. C., Zeitschr. Kryst. Min., vol. 14, p. 204, 1890.

³ Cf. H. S. Washington, Jour. Geology, vol. 22, p. 751, 1914.

⁴ Cross, Whitman, Iddings, J. P., Pirsson, L. V., Washington, H. S., Jour. Geology, vol. 20, p. 552, 1912.

worth, which has priority over the name harzburgite of Rosenbusch.

V. 1. 4. HELVETIARE (H. S. Washington, 1916). In accord with rule 6 this is adopted in place of Grubenmann's *gorduniare* (1908), which bases a subclass name on that of a small valley. It is also appropriate, as most of the known analyses falling here are of rocks in or near Switzerland, a country hitherto unrepresented in the nomenclature. Grubenmann's name root is preserved in rang V. 1. 4. 1. GORDUNASE, and subrang V. 1. 4. 1. 1. GORDUNOSE. The former name is objectionable as liable to confusion with *gordonase* II. 3. 5. 0, now rejected (cf. p. 35).

V. 1. 4. 1. 2. KAKOULIMOSE. The analysis falls transitionally in GUINEOSE V. 1. 5. 1. 2 (cf. p. 741).

V. 3. RHODARE (C. H. Warren, 1908). This name is accepted, though it is objectionable because it is based on the name of a State and because the name suggests the Island of Rhodes rather than the State of Rhode Island. Warren's name root is adopted in V. 3. 5. 1. RHODASE and V. 3. 5. 1. 3. RHODOSE.

V. II. 2. *Mainare*, V. II. 2. 3. *Mainiare*, and V. II. 2. 3. 1. 2. *Lermondose* (E. S. Bastin, 1908). These names are rejected as based on an analysis of a pyrrhotite peridotite which was not fresh and in which the two iron oxides had not been determined (cf. p. 925).

V. II. 5. 3. 3. *Lovingtonose* (Watson and Taber, 1913). The name is rejected as being only provisionally proposed and based on an analysis of a not fresh rock, which falls in a transitional position.¹

THE MAKING OF THE COLLECTION.

It may be of interest to give a few details regarding the actual making of the collection, as it has grown to proportions so large that such an undertaking will not probably be attempted again in its entirety. For this reason, in forming the present collection, the aim has been to make it as complete as possible, within the time limits set—that is, from 1884 to 1913, inclusive.

For this purpose the excellent library of the United States Geological Survey was thoroughly examined. This library contains about 100,000 volumes and over 100,000 pamphlets, and has a growth of about 2,600 volumes a year, all relating to geology and allied sciences. "It has almost complete sets of the publications of national and State geological surveys, both of America and foreign countries, and sets of all serials devoted to geology. It contains practically all the literature of geology, paleontology, and mineralogy."² The only geological library that possibly surpasses it is that of the Geological Society of London.

Every serial,³ whether published by a survey, society, or other organization, which might conceivably con-

tain petrographic material was examined volume by volume. This examination embraced publications for the years from 1883 into 1914 or 1915, though the end of 1913 was decided on as the final limit. The last number of each one from which analyses were collected will be found in the list of publications examined.

Such nonpetrographical publications as the *Paleontologica Indica* and the reports of the geological surveys of such States as Ohio, Iowa, and Alabama, which would presumably contain no petrographic descriptions of igneous rocks, were neglected. Purely technical journals, like the *Engineering and Mining Journal*, *Mining World*, and *Berg- und hüttemännische Zeitung*, were only cursorily examined, as they would presumably contain little material of value for the purpose in view. The large collection of more recent separates, dissertations, and other pamphlets was also gone over, as well as my own collection of separates. In addition, many books on the geology of various regions, books of travel, and other volumes were searched for analyses.

The analyses found were copied on cards directly from the publications, with the requisite data as to reference and other necessary features. The make-up of these cards has varied from time to time, and the form finally adopted is shown in actual size in figure 1, giving the obverse and reverse of one as actually filled out and the calculation of the norm.

These cards were first arranged geographically, by countries and localities and percentage of silica. In this way duplication and different places of publication of the same analysis were detected. They were then gone over carefully to determine the rating and general quality, after which the norms of those which were deemed to be fresh and of superior quality were calculated and the symbols noted. All the cards of the superior analyses were then arranged according to the quantitative system, after which they were copied on large sheets which bore the column headings and ruling shown in the tables. A careful reexamination was made of the analyses rejected from Part I, to distribute them among Parts II, III, and IV, during which a few were restored to Part I. On the other hand, during the writing of the manuscript of Part I, reconsideration of a number of analyses led to their relegation to other parts.

Fortunately nearly all the cards used for the preparation of the first edition had been preserved, and these were carefully collated with the analyses published in the first edition and the missing ones copied off, so that all those there given are reproduced here. Appropriate changes were made in the references, especially for the analyses made in the Survey laboratory and published in *Bulletins* 148, 168, 228, and 419. Many of these have since been republished, in connection with the papers for which they were made, in other later Survey publications. Through the kindness of F. W. Clarke, chief chemist, I had access

¹ Cf. Watson, T. L., and Taber, Stephen, *Virginia Geol. Survey Bull.* III-A, p. 127, 1913.

² Meyer, H. H. B., *Handbook of the Libraries in the District of Columbia*, p. 23, Washington, 1914.

³ The *Erläuterungen zur geologischen Karte Preussen* has not been examined since 1900 as the subsequent volumes all arrived together just as the work was being finished.

to the records of the laboratory, and, with the kind permission of the geologists of the Survey for whom they were made, I have incorporated in this collection many analyses which are not yet published or which are appearing from time to time. The records were examined up to January 1, 1915.

It may be of interest to give some figures regarding the time actively employed in making this collection, including that devoted to the search through the literature, copying off the analysis, calculating the norm,

furnish such material are represented in the books and periodicals available in the libraries visited. In the list arranged by authors there are some papers in serial publications that contain so many analyses or are otherwise so important that they have been deemed worthy of separate citation by authors' names. Neither list is quite complete, for some serials and books have been omitted because they were of minor importance or for other reasons; but the two lists present practically all the existing literature (from

SiO ₂	63.88	1.065	Analyst	Reference	Locality	Name	Symbol
Al ₂ O ₃	15.84	.155	H. K. Stokes.	W. H. Weed, U. G. V. 14, 739, 1899.	Wackerville Station, Butte, Montana.	Granite, (Cty. Monzonite)	(C) II. 4. "3.3.
Fe ₂ O ₃	2.11	.013					
FeO	2.59	.036					
MgO	2.13	.053					
CaO	3.97	.071					
Na ₂ O	2.81	.045					
K ₂ O	4.23	.045					
H ₂ O	0.66						
H ₂ O	0.22						
CO ₂							
TiO ₂	0.65	.008					
ZrO ₂							
P ₂ O ₅	0.21	.001					
SO ₂	0.34						
Cl	4						
F							
S							
Cr ₂ O ₃							
V ₂ O ₅							
MnO	0.07	.001					
NiO							
BaO	0.09						
SrO	0.02						
Li ₂ O							
Cu							
	99.82						
		Sp. Gr.					

[Obverse.]

NORM			
Q	19.38	19.38	ac
or	25.02		ns
ab	23.58	66.67	di 0.681
an	18.07	86.05	hy 7.08
lc			wo
ne			el
C			cs
			mt 3.02
			il 1.22
			hm
			ap 0.34
			0.34
			12.34
			86.05
			1.33
			99.72
CALCULATION			
or	45	P ₂ O ₅ 1	mt 13
ab	45	CaO 3	il 8
an	65		hm
lc			
ne			
Di		Hy	SiO ₂
CaO	3.35	MgO 5.10	270
MgO	2.20	FeO 15.98	270
FeO	1.13	SiO ₂ 66.708	130
SiO ₂	.68		66
		Ol	742
		MgO	1065
		FeO	523
		SiO ₂	6
MgO	53.51		19.38
FeO	16.15		

[Reverse.]

FIGURE 1.—Facsimile of card showing form of record of analysis of rock.

writing the actual manuscript, occasional verification, and other details. On an average the 4,980 analyses in Part I took 45 minutes apiece and those in Parts II, III, and IV took about 30 minutes or more apiece.

LIST OF PUBLICATIONS EXAMINED.

The following lists of publications that have been examined in the search for analyses include both serials and books and papers. Among the serials are the official Government Survey publications, the transactions, proceedings, and other publications of geologic and other scientific societies, and the scientific journals that might contain analyses. All the countries that

1883 to 1913, inclusive) which contains or might be expected to contain rock analyses.

The serials are arranged alphabetically by countries. Under each country the publications of the official surveys are given first and are followed by journals and publications of societies in general alphabetical order. In the second column is given the last number that has been examined, and in the third the abbreviation that has been adopted and generally used in the tables. The second list is arranged alphabetically by authors and the name of each book or paper is followed by the abbreviation used for it throughout the tables.

SERIAL PUBLICATIONS EXAMINED, ARRANGED BY COUNTRIES.

	Latest number examined.	Abbreviation.
ARGENTINA.		
Ministero de Agricultura, Anales.....	X, No. 1, 1914.....	Arg. Min. Agr. An.
Ministero de Agricultura, Boletín.....	(B), 9, 1914.....	Arg. Min. Agr. B.
AUSTRALIA.		
Report of the Australasian Association for the Advancement of Science.....	XIII, (1911), 1912.....	R. Aust. A. A. S.
Transactions of the Geological Society of Australasia.....	I, 1892 (all).....	Tr. G. Soc. Aust.
<i>New South Wales.</i>		
Department of Mines, Annual Report.....	(1913), 1914.....	N. S. W. Dep. Min. A. R.
Geological Survey, Memoirs.....	No. 6, 1908.....	N. S. W. G. S. Mem.
Geological Survey, Mineral Resources.....	No. 17, 1913.....	N. S. W. G. S. Min. Res.
Geological Survey, Records.....	IX, (1), 1909.....	N. S. W. Rec. G. S.
Memoirs of the Australian Museum (Sydney).....	IV, 1913.....	Mem. Aust. Mus.
Proceedings of the Linnean Society.....	XXXVIII, (3), 1913.....	Pr. Lin. Soc. N. S. W.
Proceedings of the Royal Society of New South Wales.....	XLVI, (2), 1913.....	Pr. R. Soc. N. S. W.
<i>Queensland.</i>		
Annals of the Queensland Museum.....	No. 10, 1911.....	An. Qld. Mus.
Annual Report of the Undersecretary for Mines.....	(1913), 1914.....	A. R. Sec. Min. Qld.
Geological Survey, Publications.....	No. 241, 1913.....	Qld. G. S. Pub.
Proceedings of the Royal Society of Queensland.....	XXIV, 1913.....	Pr. R. Soc. Qld.
<i>South Australia.</i>		
Geological Survey, Review of Mining Operations.....	No. 19, 1914.....	S. Aust. G. S. Rev. Min. Op.
Proceedings of the Royal Society.....	XXXVII, 1913.....	Pr. R. Soc. S. Aust.
<i>Tasmania.</i>		
Geological Survey, Bulletin.....	No. 53, 1913.....	Tas. G. S. B.
Proceedings of the Royal Society of Tasmania.....	(1913), 1914.....	Pr. R. Soc. Tas.
Report of the Secretary for Mines.....	(1912), 1913.....	Tas. Sec. Min. R.
<i>Victoria.</i>		
Geological Survey, Bulletin.....	No. 36, 1914.....	Vict. G. S. B.
Geological Survey, Memoirs.....	No. 11, 1913.....	Vict. G. S. Mem.
Proceedings of the Royal Society of Victoria.....	XXV (2), 1913.....	Pr. R. Soc. Vict.
Annual Report of the Secretary for Mines.....	(1912), 1913.....	Sec. Min. Vict. A. R.
<i>Western Australia.</i>		
Department of Mines, Annual Report.....	1913.....	W. Aust. Dep. Min. A. R.
Geological Survey, Bulletin.....	No. 53, 1913.....	W. Aust. G. S. B.
Journal of the Western Australia Natural History Society.....	IV, 1912.....	J. W. Aust. Nh. Soc.
AUSTRIA-HUNGARY.		
Abhandlungen d. K. K. Geologischen Reichsanstalt (Wien).....	XXII (2), 1912.....	Ab. G. R. A. Wien.
Jahrbuch d. K. K. Geologischen Reichsanstalt.....	LXXXII, 1912.....	Jb. G. R. A. Wien.
Verhandlungen d. K. K. Geologischen Reichsanstalt.....	1914, No. 1.....	Vh. G. R. A. Wien.
Jahrbuch d. Geologischen Reichsanstalt Ungarn.....	(1911), 1913.....	Jb. G. R. A. Ung.
Mittheilungen d. Ungarischen Geologischen Reichsanstalt.....	XXI (11), 1913.....	Mt. Ung. G. R. A.
Erläuterungen d. Geologische Karte Kroatien-Slavonien.....	1909.....	Erl. G. Kt. Kroat.
Annalen d. K. K. Naturhistorischen Hofmuseums.....	XXV, 1911.....	An. Nh. Hofmus.
Berg- und Hüttenmännisches Jahrbuch (Wien).....	LXI, 1913.....	B H. Jb.
Bulletin International de l'Académie des Sciences de Cracovie.....	(1912), 1913.....	B. Ac. Sc. Crac.
Denkschriften d. K. Akademie d. Wissenschaften (Wien).....	LXXXIII, 1913.....	Ds. Ak. W. Wien.
Sitzungsberichte d. K. Akademie d. Wissenschaften (Wien).....	CXXII (VII), 1913.....	Sb. Ak. W. Wien.
Földtani Közlöny (Buda-Pest).....	XLIII, 1913.....	F. K.
Mittheilungen d. Geologischen Gesellschaft in Wien.....	VI (2), 1913.....	Mt. G. Ges. Wien.
Sitzungsberichte d. K. Böhmischen Gesellschaft d. Wissenschaften.....	(1912), 1913.....	Sb. Bohm. Ges. W.
Mittheilungen d. Naturwissenschaftlichen Vereins für Steiermark (Graz).....	LX (1912), 1913.....	Mt. Nw. Ver. Stei.
Tschermak's Mineralogische u. Petrographische Mittheilungen.....	XXXII, 1913.....	T. M. P. M.
BELGIUM.		
Académie Royale de Belgique, Bulletin de la Classe des Sciences.....	1913.....	Ac. R. Belg. B.
Annales de la Société Géologique de Belgique.....	XLI, (1), 1911.....	An. Soc. G. Belg.
Bulletin de la Société Belge de Géologie.....	XXVII, 1913.....	B. Soc. Belg. G.
Mémoires de l'Institut Géologique de l'Université de Louvain.....	I, 1913.....	Mem. In. G. Un. Louv.
BRAZIL.		
Boletim da Comissão Geografica e Geologica de São Paulo.....	No. 19, 1906.....	B. Com. G. São P.
Memorias do Serviço Geologico e Mineralogico do Brazil.....	I, 1913.....	B. Serv. G. Braz.

SERIAL PUBLICATIONS EXAMINED, ARRANGED BY COUNTRIES—Continued.

	Latest number examined.	Abbreviation.
CANADA.		
Geological Survey, Annual Report.....	XVI, 1904.....	Can. G. S. A. R.
Geological Survey, Memoirs.....	47, 1914.....	Can. G. S. Mem.
Geological Survey, Miscellaneous Reports.....	1906.....	Can. G. S. Misc. R.
Geological Survey, Museum Bulletin.....	No. 2, 1914.....	Can. G. S. Mus. B.
Geological Survey, Summary Report.....	(1912), 1911.....	Can. G. S. Sum. R.
Ontario Mines Bureau, Report.....	XIX, (2), 1913.....	Ont. Bur. Min. R.
Transactions of the Royal Society of Canada.....	V, 1911.....	Can. R. Soc. Tr.
University of Toronto, Geological Series.....	7, 1910.....	Un. Tor. G. Ser.
DENMARK.		
Danmarks Geologiske Undersøgelser.....	III, 6, 1905.....	Dan. G. Und.
Meddelelser om Grønland.....	XLI, 1913.....	Med. Grönl.
EGYPT.		
Publications of the Survey Department.....	1913.....	Egypt Surv. Pub.
FINLAND.		
Bulletin de la Commission Géologique de Finlande.....	No. 35, 1913.....	B. C. G. Fin.
Fennia; Bulletin de la Société de Géographie de Finlande, Helsingfors.....	XXXIV, 1913-14.....	Fennia.
FRANCE.		
Bulletin des Services de la Carte Géologique de la France.....	XXI, No. 132, 1912.....	B. Sv. Ct. G. Fr.
Mémoires pour servir à l'Explication de la Carte Géologique de la France.....	1912.....	Mem. Sv. Ct. G. Fr.
Annales de la Société Géologique du Nord (Lille).....	XLI, 1912.....	An. Soc. G. Nord.
Annales des Mines.....	(11), IV, 1913.....	An. Min.
Association Française pour l'Avancement des Sciences.....	49, 1913.....	Fr. A. A. S.
Bulletin de la Société Géologique de la France.....	(4), XLII, (5), 1913.....	B. Soc. G. Fr.
Mémoires de la Société Géologique de la France.....	(1), II, 1912.....	Mem. Soc. G. Fr.
Bulletin de la Société Minéralogique de France.....	XXXVI, 1913.....	B. Soc. Min. Fr.
Bulletin du Museum Nationale d'Histoire Naturelle.....	XIX, 1913.....	B. Mus. Hist. Nat.
Comptes Rendus de l'Académie des Sciences.....	CLVII, 1913.....	C. R.
GERMANY.		
<i>Official surveys.</i>		
Baden. Mittheilungen d. Geologischen Landesanstalt.....	VII, (1), 1912.....	Mt. Bad. G. L.-A.
Baden. Erläuterungen zur Geologischen Spezialkarte.....	1912.....	Erl. G. Kt. Bad.
Bayern. Erläuterungen zur Geologischen Karte.....	1914.....	Erl. G. Kt. Bay.
Bayern. Geognostische Jahreshften.....	XXVI, (1913), 1914.....	Geog. Jhft.
Elsass-Lothringen. Mittheilungen d. Geologischen Landesanstalt.....	VIII, 1913.....	Mt. G. L.-A. Els.-Loth.
Hessen-Darmstadt. Abhandlungen d. Geologischen Landesanstalt.....	VI, (1), 1912.....	Abh. G. L.-A. Hes.
Hessen-Darmstadt. Erläuterungen zur Geologischen Karte.....	1913.....	Erl. G. Kt. Hes.
Mecklenburg. Mittheilungen d. Geologischen Landesanstalt.....	XXVII, 1911.....	Mt. G. L.-A. Meckl.
Abhandlungen d. K. Preussischen Geologischen Anstalt.....	75, 1913.....	Ab. Pr. G.-A.
Preussische Geologische Anstalt, Archiv für Lagerstätten Forschung.....	14, 1911.....	Arch. Lst. Pr. G.-A.
Erläuterungen zur Geologischen Karte Preussens.....	Cf. p. 36, no. 3.....	Erl. G. Kt. Pr.
Jahrbuch d. K. Preussischen Geologischen Anstalt.....	XXXIV, (1), 1913.....	Jb. Pr. G.-A.
Sachsen. Erläuterungen zur Geologischen Spezialkarte.....	1913.....	Erl. G. Kt. Sachs.
Württemberg. Erläuterungen zur Geologischen Spezialkarte.....	1913.....	Erl. G. Kt. Würt.
Württemberg. Mittheilungen d. Städtischen Landes-Amt.....	9, 1912.....	Mt. Lü-A. Würt.
<i>Miscellaneous.</i>		
Berlin. Abhandlungen d. K. Preussischen Akademie d. Wissenschaften.....	1912.....	Ab. Pr. Ak. W.
Berlin. Sitzungsberichte d. K. Preussischen Akademie d. Wissenschaften.....	1913.....	Sb. Pr. Ak. W.
Berlin. Zeitschrift d. Gesellschaft für Erdkunde.....	1913.....	Z. Ges. Erdk. Berl.
Bonn. Sitzungsberichte d. Naturhistorischen Vereins d. Rheinlande u. Westfalen.....	1913.....	Sb. Nh. Ver. Rheinl.
Bonn. Verhandlungen, d. Naturhistorischen Vereins d. Rheinlande u. Westfalen.....	LXIX, (1), 1913.....	Vh. Nh. Ver. Rheinl.
Danzig. Schriften d. Naturforschenden Gesellschaft.....	XIII, (2), 1912.....	Schr. Nf. Ges. Danz.
Darmstadt. Notizblatt d. Vereins für Erdkunde.....	XXXIV, 1913.....	Nb. Ver. Erdk.
Dresden. Abhandlungen d. Naturwissenschaftlichen Gesellschaft Isis.....	(1913), 1914.....	Isis.
Dresden. Jahresbericht d. Gesellschaft für Natur- und Heilkunde.....	1913.....	Jb. Ges. Nh. Dresd.
Erlangen. Sitzungsberichte d. Physikalisch-Medizinischen Societat.....	XIIV, (1912), 1913.....	Sb. Ph. Soz. Erl.
Frankfurt. Bericht d. Senckenbergischen Naturforschenden Gesellschaft.....	XL, 1913.....	Ber. Senck. Nf. Ges.
Geologische Rundschau.....	IV, 1912.....	G. Rund.
Göttingen. Nachrichten d. K. Gesellschaft d. Wissenschaften.....	1913.....	Nr. Ges. W. Gött.
Hamburg. Mittheilungen aus d. Mineralogisch-Geologisch Institut.....	XXX, 1912.....	Mt. Min. G. Inst. Hamb.
Heidelberg. Verhandlungen d. Naturhistorisch-Medizinischen Verein.....	XII, (4), 1914.....	Vh. Nh. Ver. Heid.
Jenaische Zeitschrift für Naturwissenschaft.....	XLVII, 1911.....	Z. Nw. Jena.
Leipzig. Abhandlungen d. K. Sächsischen Gesellschaft d. Wissenschaften.....	XXIX, 1901.....	Abh. Sächs. Ges. W.
Leipzig. Verhandlungen d. K. Sächsischen Gesellschaft d. Wissenschaft.....	LXV, 1913.....	Vh. Sächs. Ges. W.

SERIAL PUBLICATIONS EXAMINED, ARRANGED BY COUNTRIES—Continued.

	Latest number examined.	Abbreviation.
GERMANY—Continued.		
<i>Miscellaneous</i> —Continued.		
München. Abhandlungen d. K. Bayrischen Akademie d. Wissenschaften....	XXVI, 1913-14.....	Ab. Bay. Ak. W.
München. Sitzungsberichte d. Akademie d. Konigreich Bayern zu Wissen- schaften.	1913.....	Sb. Bay. Ak. W.
Neues Jahrbuch für Mineralogie, etc.	1913, II.	N. J.
Neues Jahrbuch für Mineralogie, Beilage Band.	XXXV, 1913.....	N. J., BB.
Centralblatt für Mineralogie, etc.	1913.....	N. J., Cb.
Petermann's Mittheilungen.....	LIX, 1913.....	Pet. Mt.
Petermann's Mittheilungen, Ergänzungsheft.....	177 (1), 1913.....	Pet. Mt., Egh.
Stuttgart. Jahresheft d. Oberrheinischen Geologischen Vereins.....	III, 1913.....	Jh. Oberr. G. Ver.
Württemberg. Jahresheft d. Vereins für Naturkunde.....	LXIX, 1913.....	Jh. Ver. Nk. Wurt.
Zeitschrift d. Deutschen Geologischen Gesellschaft.....	LXV, 1913.....	Z. D. G. G.
Zeitschrift für Krystallographie.....	LII, 1913.....	Z. K.
Zeitschrift für Praktische Geologie.....	XXI, 1913.....	Z. Prakt. G.
Zeitschrift für Vulkanologie.....	I, 1913-14.....	Z. Vulk.
GREAT BRITAIN.		
<i>Official surveys.</i>		
Geological Survey of England and Wales.....	1913.....	G. S. Eng.
Geological Survey of Great Britain, Memoirs.....	1913.....	G. S. G. B. Mem.
Geological Survey of Great Britain, Summary of Progress.....	(1913), 1914.....	G. S. G. B. Sum. Prog.
Geological Survey of Ireland, Memoirs.....	1914.....	G. S. Ir. Mem.
Geological Survey of Scotland, Memoirs.....	92, 1913.....	G. S. Scot. Mem.
Geological Survey of the United Kingdom, Memoirs.....	1913.....	G. S. U. K. Mem.
<i>Miscellaneous.</i>		
British Association for the Advancement of Science, Report.....	1913.....	B. A. A. S. R.
Cornwall. Transactions of the Royal Geological Society.....	XIII, (9), 1913.....	Tr. G. Soc. Cornw.
Dublin. Transactions of the Royal Society.....	(2), IX, 1909.....	Tr. R. Soc. Dublin.
Edinburgh. Transactions of the Geological Society.....	X, (4), 1912.....	Tr. Edinb. G. Soc.
Edinburgh. Proceedings of the Royal Society.....	XXXIII, 1913.....	Pr. R. Soc. Ed.
Edinburgh. Transactions of the Royal Society.....	XLVIII, 1912.....	Tr. R. Soc. Ed.
Geological Magazine.....	(V), X, 1913.....	G. Mag.
Geologists' Association, Proceedings.....	XXIV, 1913.....	Pr. G. Ass.
Glasgow. Transactions of the Geological Society.....	XIV, 1912.....	Tr. G. Soc. Glas.
Glasgow. Transactions of the Natural History Society.....	VIII, 1911.....	Tr. N. H. Soc. Glas.
Glasgow. Proceedings of the Royal Philosophical Society.....	XLIII, 1912.....	Pr. Ph. Soc. Glas.
Ireland. Journal of the Royal Geological Society.....	XVIII, 1889.....	J. G. Soc. Irel.
Ireland. Proceedings of the Royal Irish Academy.....	XXX, 1913.....	Pr. Ir. Ac.
Ireland. Transactions of the Royal Irish Academy.....	XXXII, 1904.....	Tr. Ir. Ac.
Leeds. Transactions of the Geological Association.....	XVI, 1911.....	Tr. Leeds G. As.
Liverpool. Proceedings of the Geological Association.....	(1908-9), 1910.....	Pr. Liv. G. As.
Liverpool. Proceedings of the Geological Society.....	XI (4), 1913.....	Pr. Liv. G. Soc.
London. Philosophical Magazine.....	(6), XXVI, 1913.....	Phil. Mag.
London. Philosophical Transactions of the Royal Society.....	CXXII, 1913.....	Phil. Trans.
London. Proceedings of the Royal Society.....	LXXXIX, 1913-4.....	Pr. R. Soc.
London. Quarterly Journal of the Geological Society.....	LXIX, 1913.....	Q. J. G. S.
Manchester. Transactions of the Geological Society.....	XXXII, 1913.....	Tr. Man. G. Soc.
Mineralogical Magazine.....	XVI, 1911-13.....	Min. Mag.
Yorkshire. Proceedings of the Geological Society.....	XVII, 1911.....	Pr. Yorks. G. Soc.
HAWAIIAN ISLANDS.		
Bernice Pauahi Bishop Museum, Occasional Papers.....	V (4), 1913.....	Bish. Mus. Pap.
INDIA.		
Geological Survey, Memoirs.....	XLIII (1), 1913.....	Mem. G. S. Ind.
Geological Survey, Records.....	XLII (1), 1914.....	Rec. G. S. Ind.
Mysore, Geological Department, Bulletin.....	No. 5, 1909.....	Mys. G. Dep. B.
Mysore, Geological Department, Records.....	XII, 1912.....	Mys. G. Dep. Rec.
Mysore, Geological Department, Report of Chief Inspector of Mines.....	(1912-3), 1914.....	Mys. Rep. Insp. Min.
INDO-CHINA.		
Memoires du Service Géologique.....	II (5), 1913.....	Mem. Sv. G. Ind. Ch.
ITALY.		
Bolletino del Comitato Geologico Italiano.....	XLIV (1), 1914.....	B. C. G. It.
Bolletino della Societa Geologica Italiana.....	XXXII, 1913.....	B. Soc. G. It.
Bolletino della Societa Seismologica Italiana.....	XVII, 1913.....	B. Soc. Seism. It.
Bolletino del Vulcanismo Italiano.....	XIII, 1886.....	B. Vulc. It.
Bologna. Accademia delle Scienze, Memorie.....		Mem. Ac. Sc. Bol.

SERIAL PUBLICATIONS EXAMINED, ARRANGED BY COUNTRIES—Continued.

	Latest number examined.	Abbreviation.
ITALY—Continued.		
Bologna. Accademia delle Scienze, Rendiconti.....		Rend. Ac. Sc. Bol.
Catania. Accademia Gioenia di Scienze, Atti.....	(V), VI, 1913.....	At. Ac. Gioen.
Gazzetta Chimica Italiana.....		Gaz. Chim. It.
Giornale di Mineralogia, etc.....	V, 1894 (all).....	Giorn. Min.
Memorie Descrittive della Carta Geologica Italiana.....	XVI, 1914.....	Mem. Ct. G. It.
Milano. R. Istituto Lombardo di Scienze, Memorie.....	(2), XLV, 1913.....	Mem. Ist. Lomb. Sc.
Milano. R. Istituto Lombardo di Scienze, Rendiconti.....	XLVI, 1913.....	Rend. Ist. Lomb. Sc.
Modena. Memorie della R. Accademia.....	(3), X, (2), 1913.....	Mem. Ac. Mo ¹ .
Napoli. Accademia delle Scienze, Atti.....	(2), XV, 1914.....	At. Ac. Sc. Nap.
Napoli. Accademia delle Scienze, Rendiconti.....	(3), XIX, 1913.....	Rend. Ac. Sc. Nap.
Napoli. R. Istituto d'Incoraggiamento, Atti.....	(6), LXV, 1913.....	Ist. Incor. Nap. At.
Roma. R. Accademia dei Lincei, Memorie.....	IX, 4, 1912.....	Mem. Ac. Linc.
Roma. R. Accademia dei Lincei, Rendiconti.....	(V), XXII, (2), 1913.....	Rend. Ac. Linc.
Societa Toscana di Scienze Naturali, Atti.....	XXII, 1913.....	At. Soc. Tosc. Sc.
Societa Toscana di Scienze Naturali, Memorie.....	1913.....	Mem. Soc. Tosc. Sc.
Torino. Accademia delle Scienze, Atti.....	XLVIII, 1913.....	At. Ac. Sc. Tor.
Ufficio Centrale Meteorologico, Bollettino.....		B. Uff. Cent. Met.
JAPAN.		
Earthquake Investigation Committee, Publications.....	No. 22C, 1908.....	
Imperial Earthquake Commission, Bulletin.....	No. 4, 1912.....	Jap. Earthq. Com. B.
Journal of the College of Science, Imperial University, Tokyo.....	XXXVI, (2), 1913.....	J. Coll. Sc. Tok.
Mittheilungen d. Deutschen Gesellschaft für Naturkunde Ostasiens.....	XIV, (3), 1913.....	Mt. D. Ges. Ostas.
Science Reports of Tohoku University, Sendai.....	III, 1914.....	Sc. Rep. Tohok. Un.
MALAY STATES.		
Geologist's Report of Progress.....	1907.....	Malay St., Rep. Prog.
MEXICO.		
Instituto Geológico, Boletín.....	30, 1913.....	Inst. G. Mex. B.
Instituto Geológico, Parergones.....	IV, 1913.....	Inst. G. Mex. Parerg.
Boletín de la Sociedad Geológica Mexicana.....	VIII, (1), 1912.....	B. Soc. G. Mex.
Sociedad Científica Antonio Alzate, Memorias.....	XXXIII, 1913.....	Mem. Soc. Ant. Alz. Mex.
NETHERLANDS.		
Amsterdam. K. Akademie van het Wettenschappen, Verhandlingen.....	XIV, (1), 1913.....	Vh. Ak. W. Amst.
Jaarboek van het Mijnwesen in Nederlandsch Oost-Indie.....	XL, (1911), 1913.....	Jb. Mijnw.
Naturkundig Tijdschrift vor Nederlandsch-Indie.....	LXXII, 1913.....	Nk. Tdsch. Ned. Ind.
Sammlungen d. Geologischen Reichsmuseum in Leiden.....	IX, 1914.....	Samml. G. R. Mus. Leid.
Tijdschrift van het K. Nederlandsch Aardrijkskundig Genootschap.....	(2), XXX, No. 5, 1913.....	Tdjs. Ned. Ardk. Gen.
NEW ZEALAND.		
Dominion Laboratory, Annual Report.....	46, 1913.....	N. Z. Dom. Lab. A. R.
Geological Survey, Bulletin.....	No. 16, 1913.....	N. Z. G. S. B.
Mines Statement.....	(1912), 1913.....	N. Z., Min. St.
New Zealand Institute, Proceedings.....	XLVI, (1913), 1914.....	Pr. N. Z. Inst.
NORWAY.		
Geologisk Undersøgelse, Publications.....	No. 65, 1913.....	Nor. G. Und.
Bergens Museum Aarbog.....	1913, (3).....	Berg. Mus. Aarb.
Kristiania. Videnskabs-Selskabet, Förhandlingar.....	(1913), 1914.....	Fh. Vids. Krist.
Kristiania. Videnskabs-Selskabet, Skrifter.....	1913, (II).....	Skr. Vids. Krist.
Norsk Geologisk Tidsskrift.....	III (1), 1914.....	Nor. G. Tdsk.
Nyt Magazin for Naturvidenskaberne.....	I, I, 1913.....	Nyt Mag.
Tromsø Museums Aarshefter.....	XXXIV, (1911), 1913.....	Troms. Mus. Aarssh.
PHILIPPINE ISLANDS.		
The Mining Bureau, Annual Report.....	6, 1905.....	P. I. Min. Bur. A. R.
Philippine Journal of Science. Bulletin.....	A., VIII, 1913.....	Phil. J. Sc. B.
PORTUGAL.		
Commission du Service Geologique du Portugal, Memoire.....	1911.....	Mem. Com. Sv. G. Port.
Comunicações da Comissão do Serviço Geológico do Portugal.....	IX, 1913.....	Com. Com. Sv. G. Port.
ROMANIA.		
Anuarul Institutului Geologic.....	V, 1a, (1911), 1912.....	An. Inst. G. Rum.
Institut Géologique de Roumanie, Comptes Rendus.....	II, 1911.....	Inst. G. Rum. C. R.
Anuarulu Muselului de Geologia.....	IV, 1910.....	An. Mus. G. Rum.

SERIAL PUBLICATIONS EXAMINED, ARRANGED BY COUNTRIES—Continued.

	Latest number examined.	Abbreviation.
RUSSIA.		
Comité Géologique de la Russie, Bulletin.....	XXXI, No. 8, 1912.....	B. C. G. Rus.
Comité Géologique de la Russie, Memoire.....	No. 86, 1912.....	Mem. C. G. Russ.
Explorations Géologiques dans les Regions Aurifères de la Sibirie.....	Various to 1912.....	Reg. Aur. Sib.
Academie Imperiale des Sciences de St. Petersburg, Bulletin.....	(VI), 7, 1913.....	Ac. Imp. St. P. B.
Academie Imperiale des Sciences de St. Petersburg, Memoires.....	(VIII), 22, 1910.....	Ac. Imp. St. P. Mem.
Annales de l'Institut Polytechnique, Pierre le Grand, St. Petersburg.....	Various to XVII, 1911.....	An. Inst. Pol. Pet. Gt.
Annuaire Géologique et Mineralogique de la Russie.....	XV, No. 3, 1913.....	Ann. G. M. Rus.
Russische Mineralogische Gesellschaft, Verhandlungen.....	XLIX (2), 1912.....	Vh. Rus. M. Ges.
Société Imperiale de Naturalistes de Moscou, Bulletin.....	XXVIII, 1914.....	B. Soc. Nat. Mosc.
SOUTH AFRICA.		
Cape of Good Hope, Geological Commission, Annual Report.....	16 (1911), 1912.....	G. Com. Cape G. H. A. R.
Union of South Africa, Report of the Geological Survey (Transvaal).....	(1909), 1910.....	U. S. Afr. G. S. R.
Union of South Africa, Geological Survey, Map Sheet.....	No. 13, 1914.....	U. S. Afr. G. S. Sh.
Union of South Africa, Geological Survey, Memoir.....	No. 6, 1912.....	U. S. Afr. G. S. Mem.
Natal. Report of the Government Geologist.....	No. 3, 1907.....	Natal Gov. G. R.
Natal. Annals of the Natal Museum.....	II (4), 1913.....	An. Natal Mus.
Southern Rhodesia Geological Survey, Bulletin.....	No. 4, 1914.....	S. Rhodesia G. S. B.
Annals of the South African Museum.....	XII, 1913.....	An. S. Afr. Mus.
Geological Society of South Africa, Transactions.....	XVI (1913), 1914.....	Tr. G. Soc. S. Afr.
The South African Journal of Science.....	X, No. 4, 1913.....	S. Afr. J. Sc.
SPAIN.		
Comisión del Mapa Geológica de España, Boletín.....	XXVII (1900), 1903.....	Com. Mapa G. Esp. B.
Comisión del Mapa Geológica de España, Memoria.....	VI, 1907.....	Com. Mapa G. Esp. Mem.
Sociedad Espanola de Historia Natural, Boletín.....	XIII, 1913.....	Soc. Esp. Nh. B.
Sociedad Espanola de Historia Natural, Memoria.....	IX, 1913-14.....	Soc. Esp. Nh. Mem.
SWEDEN.		
Sveriges Geologiska Undersökning, Ahandlingar, Ars bog.....	No. 259, 1913.....	Sv. G. Und., Afh.
Arkiv for Kemi, Mineralogi och Geologi.....	IV, 1912-13.....	Ark. F. Kemi.
Geologiska Föreningens i Stockholm Förhandlingar.....	XXXV, 1913.....	G. F. F.
Lunds Universitetets Aarskrift.....	IX, 1913.....	Lund Un. Aars.
Lunds Universitetets Geologisk-Mineralogiska Institution, Meddelandena.....	21, 1912.....	Lund Un. G. M. Inst. Med.
K. Svenska Vetenskapsakademiens Handlingar.....	L, 1913.....	Sv. Vet. Ak. Hnd.
K. Svenska Vetenskapsakademiens Handlingar Bihang.....	XXXVIII, 1903.....	Sv. Vet. Ak. Hnd. Bih.
Öfversigt af K. Vetenskaps-Akademiens Förhandlingar.....	LIX, 1902.....	Öfv. Sv. Vet. Ak. Hnd.
Bulletin of the Geological Institution of the University of Upsala.....	XII, 1913-14.....	B. G. Inst. Un. Ups.
Upsala Universitetets Mineralogisk-Geologiska Institution, Meddelanden.....	XXX, 1906.....	Med. Un. Ups. G. M. Inst.
SWITZERLAND.		
Beiträge zur Geologische Karte d. Schweiz.....	XLIII, 1913.....	Btr. G. Kt. Schw.
Erläuterungen zur Geologischen Karte d. Schweiz.....	No. 13, 1913.....	Erl. G. Kt. Schw.
Ecloge Geologie Helvetiae.....	XII, 1913.....	Ecl. G. Helv.
Archives des Sciences Physiques et Naturelles de Geneve.....	XXXVI, 1913.....	Arch. Sc. Ph. Gen.
Bulletin des Laboratoires de l'Université de Lausanne.....	19, 1913.....	B. Lab. Un. Laus.
UNITED STATES.		
<i>Official surveys.</i>		
United States Geological Survey, Annual Report.....	No. 35, 1913.....	U. S. G. S. A. R.
United States Geological Survey, Bulletin.....	No. 586, 1914.....	U. S. G. S. B.
United States Geological Survey, Geologic Folio.....	No. 190, 1913.....	U. S. G. S. Fol.
United States Geological Survey, Mineral Resources.....	1913.....	U. S. G. S. Min. Res.
United States Geological Survey, Monograph.....	LIII, 1915.....	U. S. G. S. Mon.
United States Geological Survey, Professional Paper.....	88, 1915.....	U. S. G. S. P. P.
Arkansas Geological Survey, Annual Report.....	V (1892), 1900.....	Ark. G. S. A. R.
California Mining Bureau, Bulletin.....	No. 67, 1914.....	Cal. M. Bur. B.
Colorado Geological Survey, Bulletin.....	No. 6, 1913.....	Col. G. S. B.
Connecticut State Geological and Natural History Survey, Bulletin.....	No. 20, 1913.....	Conn. G. S. B.
Georgia Geological Survey, Bulletin.....	No. 29, 1914.....	Ga. G. S. B.
Kentucky Geological Survey, Bulletin.....	No. 21, 1912.....	Ky. G. S. B.
Maryland Geological Survey, Publications.....	1913.....	Md. G. S. Pub.
Maryland Geological Survey, Report.....	1913.....	Md. G. S. R.
Michigan Geological Survey, Annual Report.....	(1908), 1909.....	Mich. G. S. A. R.
Michigan Geological Survey, Publications.....	IX, (1), 1903.....	Mich. G. S. Pub.
Michigan Geological and Biological Survey, Publications.....	15, 1914.....	Mich. G. B. S. Pub.
Minnesota Geological and Natural History Survey, Bulletin.....	X, 1894.....	Minn. G. Nh. S. B.
Minnesota Geological and Natural History Survey, Final Report.....	V, 1900.....	Minn. G. Nh. S. R.
Missouri Bureau of Geology and Mines, Report.....	XII, 1913.....	Mo. Bur. G. R.
Missouri Geological Survey, Report.....	XIII, 1900.....	Mo. G. S. R.
New Jersey Geological Survey, Annual Report.....	(1912), 1913.....	N. J. G. S. A. R.
New Jersey Geological Survey, Bulletin.....	No. 11, 1913.....	N. J. G. S. B.

SERIAL PUBLICATIONS EXAMINED, ARRANGED BY COUNTRIES—Continued.

	Latest number examined.	Abbreviation.
UNITED STATES—Continued.		
<i>Official surveys—Continued.</i>		
New York State Museum, Bulletin.....	No. 172, 1914.....	N. Y. St. Mus. B.
New York State Museum, Report.....	65, (2), 1913.....	N. Y. St. Mus. R.
North Carolina Geological Survey, Bulletin.....	XXIII, 1911.....	N. C. G. S. B.
North Carolina Geological Survey, Economic Papers.....	No. 36, 1914.....	N. C. G. S. Ec. P.
North Carolina Geological Survey, Publications.....	III, 1912.....	N. C. G. S. Pub.
Oklahoma Geological Survey, Bulletin.....	No. 17, 1914.....	Okl. G. S. B.
Pennsylvania Topographical and Geological Survey, Report.....	10, 1913.....	Penn. G. S. R.
South Carolina Geological Survey, Bulletin.....	(IV), 2, 1908.....	S. C. G. S. B.
Tennessee Geological Survey, Bulletin.....	No. 17, 1914.....	Tenn. G. S. B.
Texas Geological Survey, Bulletin.....	No. 9, 1904.....	Tex. G. S. B.
Vermont, Report of the State Geologist.....	VIII, 1912.....	Vt. G. S. R.
Virginia Geological Survey, Bulletin.....	VIII, 1913.....	Va. G. S. B.
Washington Geological Survey, Bulletin.....	No. 16, 1912.....	Wash. G. S. B.
West Virginia Geological Survey, Report.....	V(A), 1913.....	W. Va. G. S. R.
Wisconsin Geological and Natural History Survey, Bulletin.....	XXVII, 1914.....	Wisc. G. S. B.
<i>Miscellaneous.</i>		
Academy of Natural Sciences of Philadelphia, Proceedings.....	LXV, 1913.....	Pr. Ac. N. Sc.
American Academy of Arts and Sciences, (Boston), Proceedings.....	1913.....	Pr. Am. Ac.
American Association for the Advancement of Science, Proceedings.....	1913.....	A. A. A. S., Pr.
American Geologist.....	XXXVI, 1905 (all).....	A. G.
American Institute of Mining Engineers, Transactions.....	XLV, 1913.....	Tr. A. Inst. M. E.
American Journal of Science.....	(4), XXXVIII, 1914.....	A. J. S.
American Philosophical Society (Philadelphia), Proceedings.....	LII, 1913.....	Pr. Am. Ph. Soc.
California Academy of Science, Proceedings.....	(4), III, 1913.....	Pr. Cal. Ac. Sc.
Colorado Scientific Society, Proceedings.....	X (1911), 1914.....	Pr. Col. Sc. Soc.
Connecticut Academy of Arts and Sciences, Transactions.....	XVI, 1911.....	Tr. Conn. Ac.
Economic Geology.....	IX, 1914.....	Ec. G.
Engineering and Mining Journal.....	IV (3), 1913.....	Eng. Min. J.
Field Museum Publications, Geological Series.....	IX, 1913.....	Fld. Mus. Pub.
Geological Society of America, Bulletin.....	XXI, 1913.....	B. G. S. A.
Journal of Geology.....	IX (2), 1913.....	J. G.
Mining World.....	XXIII, 1913-14.....	Min. World.
Museum of Comparative Zoology, Bulletin (Cambridge).....	XX, 1910.....	B. M. C. Z.
New York Academy of Sciences, Annals.....	XXXV, 1914.....	An. N. Y. Ac.
Philosophical Society of Washington, Bulletin.....	LXI, 1913-14.....	B. Ph. Soc. Wash.
School of Mines Quarterly (New York).....	XXI, 1908.....	Sch. M. Q.
Smithsonian Miscellaneous Collections.....	XLV, 1913.....	Smiths. M. C.
Technology Quarterly (Boston).....	VII, 1913.....	Tech. Q.
United States National Museum, Proceedings.....	III, 1909.....	Pr. Nat. Mus.
University of California, Publications, Bulletin of the Department of Geology.....	IV, 1914.....	Un. Cal. Dep. G., B.
University of Wisconsin, Science series, Bulletin.....	XIII, 1911.....	B. Un. Wisc.
Washington Academy of Sciences, Journal.....		J. Wash. Ac.
Washington Academy of Sciences, Proceedings.....		Pr. Wash. Ac.

LIST OF AUTHORS OF BOOKS AND PAPERS CITED.

	Abbreviation.
Abich, H., Geologie d. Armenischen Hochgebirges.....	G. Armen. Hochg.
Alla Memoria di Antonio d'Achiardi, Pisa, 1903.....	Mem. d'Ach.
Arsandaux, H., Contribution à l'Étude des Roches Alcalines de l'Est-Africain. Paris, 1906.....	R. Alc. Est-Afr.
Belowsky, M., in Reiss and Stübel, Hochgebirge d. Republik Ecuador, I, 1892.....	Hochg. Rep. Ec.
Bergat, A., Die Aedischen Inseln (Abh. Bay. Ak. W., XX, 1899).....	Aeol. Ins.
Bergt, W., in Reiss and Stübel, Geologische Studien in d. Republik Colombia, Berlin, II, 1899.....	G. Stud. Rep. Col.
Bogdanovitch, K., Fundort des Marekanits (Russian), St. Petersburg, 1904.....	Fund. Marek.
Brögger, W. C., Die Eruptivgesteine d. Kristianigebietes, Kristiania; I, 1894, II, 1895, III, 1898.....	Ég. Kg.
Brouwer, H. A., Oorsprong en Samenstelling d. Transvaalsche Nephelien Syenieten, Hague, 1910.....	Trans. Neph. Sy.
Bugge, C., in Report of 2d Norwegian Arctic Expedition in the Fram, Christiania, 1910.....	R. 2d Fram Exp.
Congrès Géologique Internationale, Comptes Rendus and Guides, XII, Canada, 1913.....	Cong. G. Int.
Duparc, L., and Mrazec, L., Recherches Géologiques et Petrographiques sur le Massif du Mont Blanc, Soc., Ph. Gen., Mem. XXXIII, 1900.....	Mass. Mont Blanc.
Duparc, L., and Pearce, F., L'Oural du Nord, Soc. Ph. Gen. Mem., I, XXXIV (2), 1902; II, XXXIV (5), 1905; III, XXXVI (1), 1909.....	Oural Nord.
Duparc, L., Pearce, F., and Ritter, E., Les Roches Eruptivés des Environs de Ménerville (Algerie), Soc. Ph. Gen., Mem. XXXIII, 1900.....	Roch. Erup. Men.
Elich, E., in Reiss and Stübel, Hochgebirge d. Republik Ecuador, Berlin, I, 1893.....	Hochg. Rep. Ec.
Elich, E., in Reiss and Stübel, Vulkanische Gebirge d. Ost-Cordillere, Berlin, I, 1901.....	Vulk. Geb. Ost-Cord.
Esch, E., in Reiss and Stübel, Hochgebirge d. Republik Ecuador, Berlin, II, 1896.....	Hochg. Rep. Ec.
Felix, J., and Lenk, H., Beiträge zur Geologie d. Republic Mexico, Leipzig, 1889-1899.....	Btr. G. Mex.
Festschrift Harry Rosenbusch, Stuttgart, 1906.....	Ros. Fests.
Futterer, K., Durch Asien, Berlin, 1911.....	Durch Asien.

LIST OF AUTHORS OF BOOKS AND PAPERS CITED—Continued.

	Abbreviation.
Geijer, P., <i>Geology of the Kiruna District</i> , II, Stockholm, 1910.....	G. Kir. Dist.
Geikie, A., <i>The Ancient Volcanoes of Great Britain</i> , London, 1897.....	Anc. Volc. G. B.
Gourdon, E., <i>Expédition Antarctique Française, Géographie Physique, etc.</i> , Paris, 1908.....	Exp. Ant. Fr.
Gümbel, C., <i>Geologie von Bayern</i> , II, München, 1894.....	G. Bayern.
Harada, T., <i>Die Japanischen Inseln</i> , Berlin, 1890.....	Jap. Ins.
Harker, A., <i>The Bala Volcanic Series</i> , Cambridge, 1889.....	Bala Volc. Ser.
Harker, A., <i>The Tertiary Igneous Rocks of Skye</i> (Mem. G. S. U. K.), Glasgow, 1904.....	Ig. R. Skye.
Harrison, J. B., <i>Geology of the Goldfields of British Guiana</i> , London, 1908.....	G. Goldf. Br. G.
Harrison, J. B., <i>Rocks and Soils of Grenada and Carriacou</i> , London, 1896.....	Rocks Gren.
Hatch, F. H., and Corstorphine, G. S., <i>Geology of South Africa</i> , London, 1905.....	G. So. Afr.
Herz, R., in Reiss and Stübel, <i>Hochgebirge d. Republik Ecuador</i> , Berlin, I, 1892.....	Hochg. Rep. Ec.
Hirschwald, <i>Handbuch d. Bautechnischen Gesteinsprüfung</i> , Berlin, 1912.....	HB. Bautech. Gestp.
Iddings, J. P., <i>Igneous Rocks</i> , II, New York, 1913.....	Ign. R.
Judd, J. W., <i>The Eruption of Krakatoa; Report of the Committee of the Royal Society of London</i> , 1888.....	Er. Krak.
Klautzsch, A., in Reiss und Stübel, <i>Hochgebirge d. Republik Ecuador</i> , Berlin, I, 1893, 1898.....	Hochg. Rep. Ec.
Knop, A., <i>Der Kaiserstuhl in Briesgau</i> , Leipzig, 1892.....	D. Kaiserstuhl.
Kuch, R., in Reiss und Stübel, <i>Geologische Studien in d. Republik Colombia</i> , Berlin, I, 1892.....	G. Stud. Rep. Col.
Lacroix, A., <i>Etude Minéralogique des Produits Silicatés de l'Eruption du Vésuve</i> (Avril, 1906), <i>Nouv. Arch. du Museum</i> , Paris, (4), IX, 1907.....	Erupt. Ves.
Lacroix, A., <i>La Montagne Pelée et ses Eruptions</i> , Paris, 1904.....	Mont. Pelee.
Lacroix, A., <i>Matériaux pour la Minéralogie de Madagascar</i> , <i>Nouv. Arch. du Museum</i> , Paris, I, (4), IV, 1902, II, (4), V, 1903.....	Mat. Min. Mad.
Lacroix, A., <i>Syenites Nepheliniques de l'Archipel de Los</i> , <i>Nouv. Arch. du Museum</i> , Paris, (5), III, 1911.....	Arch. Los.
de Lapparent, J., <i>Etude Comparative de quelques Porphyroides Françaises</i> , Paris, 1909.....	Porph. Fr.
Leptsius, R., <i>Geologie von Attika</i> , Berlin, 1893.....	G. Attika.
Loewinson-Lessing, F., <i>Geologische Skizze der Besitzung Jushno-Saorsersk, Jurjev</i> (Dorpat), 1900.....	Jush. Saos.
Manasse, E., <i>Contribuzioni allo Studio Petrografico della Colonia Eritrea</i> , Siena, 1909.....	Stud. Pet. Erit.
Merzbacher, G., <i>Aus der Hochregion des Kaukasus</i> , Leipzig, 1901.....	Kaukasus.
Osann, A., <i>Beiträge zur Chemischen Petrographie</i> , Stuttgart, II, 1905; III (1), 1914.....	Osann.
Prior, G. T., <i>National Antarctic Expedition; London, Natural History</i> , I, 1907.....	Nat. Ant. Exp.
Reinisch, R., in <i>Deutsche Südpolar Expedition</i> , II, 1912.....	D. Sudp. Exp.
Reinisch, R., in <i>Deutsche Tiefsee Expedition</i>	D. Tiefs. Exp.
Reinisch, R., in <i>Deutsche Zentral-Afrika Expedition</i>	D. Zentaf. Exp.
Renard, A., <i>Petrology of Oceanic Islands; Reports of Challenger Expedition, Physics and Chemistry</i> , II (VII), 1889.....	Pet. Oc. Isl.
Roccati, A., in <i>Duca degli Abruzzi, Il Ruwenzori</i> , <i>Geologia</i> , Milano, II, 1909.....	Ruwenz.
Rosenbusch, H., <i>Elemente der Gesteinslehre</i> , Stuttgart, 3d edition, 1910.....	Elem. Gest.
Sabatini, V., <i>I Monti Cimini</i> , <i>Mem. Com. G. Ital.</i> , Roma, XV, 1912.....	Mont. Cim.
Sabatini, V., <i>Il Vulcano Laziale</i> , <i>Mem. Com. G. Ital.</i> , Roma, X, 1900.....	Vulc. Laz.
Schmidt, C., in <i>Sarasin, P. and F., Entwurf einer Geographisch-Geologischen Beschreibung d. Insel Celebes</i> , Wiesbaden, 1901.....	Ins. Celeb.
Sobral, J. M., <i>Contributions to the Geology of the Nordingra Region</i> , Upsala, 1913.....	G. Nord. Reg.
Subantarctic Islands of New Zealand, Wellington, 1909.....	Subant. Isl.
Tannhäuser, F., in Reiss und Stübel, <i>Vulkanische Gebirge d. Ost-Cordillere</i> , Berlin, II, 1904.....	Vulk. Geb. Ost.-Cord.
Teall, J. J. H., <i>British Petrography</i> , London, 1888.....	Brit. Petr.
Tscherwinsky, P., <i>Quantitative Zusammensetzung der Granite und Greisen</i> , Moscow, 1911.....	Russian; not examined.
Ussing, N. V., <i>Geology of the Country around Julianehaab, Greenland; Meddel. Grönl.</i> , Copenhagen, XXXVIII, 1911.....	G. Juhlhb.
Vandernotte, L., <i>l'Étude Géologique des Roches Éruptives du Massif Armoricaïn</i> , Paris, 1913.....	Mass. Armor.
Verbeek, R. D. M., <i>Sumatra's Westkust</i> , Batavia, 1883.....	Sum. Westk.
Verbeek, R. D. M., <i>Verslagen over de Uitbarsting van Krakatau</i> , Batavia, 1884.....	Krakatau.
Vitalis, J., <i>Resultate d. Wissenschaftlichen Erforschung d. Balaton Sees</i> , I (1), <i>Geologie, etc.</i> , Wien, 1911.....	Erf. Bal. Sees.
Vogt, J. H. L., <i>Die Silikatschmelzlösungen</i> , Christiania, I, 1903, II, 1904.....	Sil. Schm. Lös.
Wagner, P. A., <i>Diamantführende Gesteine Südafrikas</i> , Berlin, 1909.....	Diam. Gest. S. Afr.
Wagner, P. A., <i>The Diamond Fields of South Africa</i> , Johannesburg, 1914.....	Diam. Flds. S. Afr.
Washington, H. S., <i>Chemical Analyses of Igneous Rocks</i> , U. S. Geol. Surv., Prof. Paper No. 14, 1903.....	W. T.
Washington, H. S., <i>Roman Comagmatic Region</i> , Carnegie Institution of Washington, Publication No. 57, 1906.....	R. C. R.
Washington, H. S., <i>Superior Analyses of Igneous Rocks from Roth's Tabellen</i> , U. S. Geol. Surv., Prof. Paper No. 28, 1904.....	W. R. T.
Wichmann, A., <i>Gesteine von Timor</i> , Leiden, 1889.....	Gest. Tim.
Williams, J. F., <i>Igneous Rocks of Arkansas</i> ; G. S. Ark., A. R. (1890), Little Rock, 1891.....	Ign. R. Ark.
Von Wolf, F., in Reiss und Stübel, <i>Vulkanische Gebirge d. Ost-Cordillere</i> , Berlin, III, 1904.....	Vulk. Geb. Ost.-Cord.
Young, G., in Reiss und Stübel, <i>Hochgebirge d. Republik Ecuador</i> , Berlin, II, 1912.....	Hochg. Rep. Ec.

LIST OF ABBREVIATIONS.

Only the English form of words etymologically alike, but in different languages, is given. Some abbreviations of serial publications, which may not be readily self-explanatory, are also given here. These and the others will be found in the List of publications (p. 38).

REFERENCES.

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|---|--|
| A.....American. | H.....History. |
| A. A. A. S.....American Association for the Advancement of Science. | Hab. Schr.....Habitations Schrii |
| Aarb.....Aarbog. | Hd.....Handlingar, etc. |
| Aars.....Aarskrift. | Hes.....Hessen. |
| Ab.....Abhandlung. | Imp.....Imperial. |
| Ac.....Academy, etc. | Ind.....India. |
| Afh.....Afhandlingar. | In. Diss.....Inaugural Dissertation. |
| Afr.....Africa. | Inst.....Institute. |
| A. G.....American Geologist (Minneapolis). | Int.....International. |
| *Agr.....Agriculture. | Ir.....Ireland, Irish. |
| A. J. S.....American Journal of Science (New Haven). | It.....Italy, etc. |
| Ak.....Akademie. | J.....Journal. |
| Am.....American. | Jb.....Jahresbericht. |
| An.....Annals, etc. | J. G.....Journal of Geology (Chicago). |
| Anh.....Anhang. | Jh.....Jahresheft. |
| Anz.....Anzeiger. | K.....Kaiserlich, Königlich, etc. |
| A. R.....Annual Report. | Kt.....Karte. |
| As.....Association. | L-A.....Landes-Anstalt. |
| At.....Atti. | Lab.....Laboratory. |
| Aust.....Australia. | M.....Mineralogy, etc. |
| B.....Bulletin, etc. | Mag.....Magazine. |
| Bad.....Baden. | M. E.....Mining Engineers. |
| B. B.....Beilage Band. | Med.....Meddelelser, Medical, etc. |
| Ber.....Berichte, Berlin. | Mem.....Memoir, Mémoire, etc. |
| B. G. S. A.....Bulletin of the Geological Society of America. | Min.....Mining, etc. |
| Bl.....Blatt. | Mon.....Monograph. |
| B. M. C. Z.....Bulletin of the Museum of Comparative Zoology. | Mus.....Museum. |
| Btr.....Beiträge. | N.....New, etc. |
| Bu., Bur.....Bureau. | Nat.....National, Nature, etc. |
| C.....Commission, etc. | Nb.....Notizblatt. |
| Cb.....Centralblatt. | Nf.....Naturforscher. |
| C. I. P. W.....Cross, Iddings, Pirson, Washington. | Nh.....Natural History, etc. |
| Com.....Commission, etc. | N. J.....Neues Jahrbuch für Mineralogie, etc. (Stuttgart). |
| Cong.....Congress. | N. J. B. B.....Neues Jahrbuch, Beilage Band. |
| C. R.....Comptes Rendus de l'Academie Francaise. | N. J., Cb.....Centralblatt für Mineralogie. |
| Ct.....Carte. | Nk.....Naturkundig, etc. |
| D.....Deutsch. | No.....Number, etc. |
| Dep.....Department. | Nor.....Norge (Norway). |
| Dist.....District. | N. S. W.....New South Wales. |
| Ds.....Denkschrift. | Nw.....Naturwissenschaft. |
| Ec. G.....Economic Geology. | N. Z.....New Zealand. |
| Ed.....Edinburgh. | Ov.....Översigt. |
| Erdk.....Erdkunde. | P.....Petrography, etc. |
| Erl.....Erläuterungen, Erlangen. | Ph.....Philosophy, etc. |
| Exc.....Excursion. | Phys.....Physical, etc. |
| Exp.....Expedition. | P. P.....Professional Paper. |
| Fh.....Forhandlingar. | Pr.....Proceedings, etc., Preussen. |
| Fin.....Finland. | Pt.....Part. |
| F. K.....Földtany Közlöny. | Pub.....Publication. |
| Fol.....Folio. | Q.....Quarterly. |
| Fr.....France, etc. | Q. J. G. S.....Quarterly Journal of the Geological Society (London). |
| G.....Geology, etc. | Qld.....Queensland. |
| G. B.....Great Britain. | R.....Royal, Report. |
| Ges.....Gesellschaft. | R-A.....Reichs-Anstalt. |
| G. F. F.....Geologiske Förening i Stockholm Förhandlingar. | R. C. R.....Roman Comagmatic Region (Carnegie Pub. 57, 1906). |
| G. Kt.....Geologische Karte. | Rec.....Records. |
| G. Mag.....Geological Magazine. | Rend.....Rendiconti. |
| G. S.....Geological Survey. | Rep.....Report, Republic. |
| | Rev.....Review, etc. |
| | S.....Survey, South. |
| | Sb.....Sitzungsberichte. |
| | Sc.....Science. |
| | Schw.....Schweiz (Switzerland). |
| | Sec.....Secretary. |
| | Sh.....Sheet. |
| | Soc.....Society. |
| | Sp. K.....Spezial Karte. |
| | Sv.....Service, Sverige (Sweden). |

T. M. P. M. Tschermak's Mineralogische Petrographische Mittheilungen.
 Tr. Transactions.
 Un. University.
 Und. Undersökning, etc.
 Ung. Ungarn (Hungary).
 Ups. Upsala.
 U. S. United States of America.
 U. S. G. S. United States Geological Survey.
 V. Volume.
 Ver. Verein.
 Vh. Verhandlung.
 Vid. Videnskap.
 W. Wissenschaft.
 Z. Zeitschrift.
 Z. D. G. G. Zeitschrift der Deutschen Geologischen Gesellschaft.
 Z. K. Zeitschrift für Kristallographie.

NORMATIVE MOLECULES.

A. apatite subgroup (apatite, fluorite, calcite, pyrite, iron, etc.).
 ab. albite.
 ac. acmite.
 an. anorthite.
 ap. apatite.
 C. corundum.
 cc. calcite.
 cm. chromite.
 cs. Ca_2SiO_4 .
 di. diopside.
 en. enstatite.
 F. feldspar subgroup (orthoclase, albite, anorthite).
 fa. fayalite.
 fo. forsterite.
 fr. fluorite.
 fs. ferrosilite (FeSiO_3).
 H. hemic subgroup (magnetite, chromite, hematite).
 hl. halite, NaCl .
 hm. hematite.
 hy. hypersthene.
 il. ilmenite.
 ir. iron (metallic).
 kp. kaliophillite.
 ks. potassium metasilicate.
 L. lenad subgroup (leucite, nephelite, halite, thenardite).
 lc. leucite.
 M. mitic subgroup (magnetite, chromite, hematite, ilmenite, titanite, perovskite, rutile).
 mt. magnetite.
 nc. sodium carbonate (Na_2CO_3).
 ne. nephelite.
 ns. sodium metasilicate.
 O. olivine subgroup (fayalite, forsterite, Ca_2SiO_4).
 ol. olivine.

or. orthoclase.
 P. pyroxene subgroup (acmite, sodium metasilicate, potassium metasilicate, diopside, wollastonite, hypersthene).
 pf. perovskite.
 pr. pyrite.
 Q. quartz.
 ru. rutile.
 sp. spinel.
 T. tilic subgroup (ilmenite, titanite, perovskite, rutile).
 th. thenardite, Na_2SO_4 .
 tn. titanite.
 wo. wollastonite.
 Z. zircon.

MISCELLANEOUS.

bet. between.
 cor. corrected.
 E. east.
 ign. ignition.
 lab. laboratory.
 M. miles.
 N. north.
 n. near.
 n. d. not determined.
 org. organic matter.
 p. page.
 Pers. com. Personal communication in advance of publication.
 R. rang.
 rec. records.
 Ref. reference.
 S. south.
 sp. gr. specific gravity.
 SR. subrang.
 tr. trace.
 W. west.
 X. rare earths, not identified, insoluble in melted KHSO_4 .

ADDENDA TO NORMATIVE NAMES (page 35).

II.7.1.5. ANTANGAINOSE. Name proposed by A. Lacroix (personal communication); represented by a rock from Madagascar (p. 581).

II.7.2.3. BAWEANOSE. Name proposed by J. P. Iddings (personal communication); represented by a rock from Bawean Island (p. 581).

III.9.1.1. MADUPOSE. Name originally applied to III.9.1.2. The single analysis is transitional as to subrang (p. 701). Transferred to this position (perpotassic), as it actually falls here and because it thus harmonizes better with orendose (III.5.1.1) and wyomingose (III.6.1.1). Also, III.9.1.2 is not represented by an analysis.

IV.2.3.1. *Texase*. Rejected and replaced by UVALDOSE, to conform with a modification of rules for nomenclature suggested by C.I.P.W. (Jour. Geology, vol. 20, p. 553, 1912).

ANALYSES.

PART I.—SUPERIOR ANALYSES OF FRESH ROCKS.

ORDER 1. PERQUARIC. VICTORARE. (C. I. P. W., 1902.)

SUBRANG. NOT NEEDED.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I.1''1.4.	Q 91.74 hy 0.23 or 1.67 ab 4.72	Hardrigg, Gill, Eskdale, Cum- berland, England.	A. R. Dwerry- house.	A. R. Dwerryhouse, Q. J. G. S., LXV, p. 64, 1909.	Granite.	Margin of No. 118, I.4.1.3.
2	I.1.0.0.	Not calculated	Adriaans Kop, Secucuni Land, Transvaal.	C. C. Gardt- hausen.	A. L. Hall, Tr. G. Soc. S. Afr., XIII, p. 14, 1911.	Quartz rock.	97.43 of SiO ₂ is quartz.
3	I.1.0.0.	Not calculated	Signal Hill, Secucuni Land, Transvaal.	C. C. Gardt- hausen.	A. L. Hall, Tr. G. Soc. S. Afr., XIII, p. 14, 1911.	Quartz rock.	97.15 of SiO ₂ is quartz.

ORDER 2. DOQUARIC. BELGARE. (C. I. P. W., 1902.)

SUBRANG 1-2. PREPOTASSIC. ARIZONOSE. (SPURR AND WASHINGTON, UNPUBLISHED.)

1	I.(1)2.''2.2(3).	Q 83.70 hy 1.89 or 7.78 il 0.30 ab 4.19 an 1.67 C 0.20	Mount Orient, Pelham, Hamp- shire County, Massachusetts.	E. T. Allen.	B. K. Emerson, A. J. S., XL, p. 215, 1915.	Northfieldite (quartz rock).	Pers. com.
2	I.''2.1.(1)2.	Q 80.64 hy 0.50 or 15.57 il 0.30 ab 2.10 hm 0.38 an 0.28 ru 0.08 C 0.10	Helvetia, Arizona.	H. S. Wash- ington.	Spurr and Washington, not published.	Arizonite (quartz dike rock).	
3	I.2(3).1.1.	Q 55.62 hy 0.70 or 27.80 mt 1.39 ab 1.05 hm 0.16 an 1.67 C 8.36	Tonopah, Nevada.	W. F. Hille- brand.	J. E. Spurr, Ec. G., I, p. 375, 1906.	Muscovite granite.	No feldspar.
4	I.''2.1.''2.	Q 68.82 hy 6.33 or 11.12 mt 0.93 ab 2.10 il 0.15 C 6.53	Bully Hill mine, Shasta County, California.	E. T. Allen.	J. S. Diller, U. S. G. S. B. 213, p. 127, 1903.	Metarhyolite.	
5	I.2.1.''2.	Q 68.76 hy 1.79 or 14.46 mt 0.46 ab 2.62 an 0.28 C 8.98	Heidenstein, Münsterthal, Schwarzwald.	Student of Bunsen.	A. Schmidt, Ref., N. J., 1889, I, p. 95.	Porphyry.	In W. T., p. 123.
6	I.2(3).1.1''.	Q 54.42 hy 0.80 or 27.24 mt 0.70 ab 2.10 il 0.76 an 0.56 hm 1.76 C 8.87 ap 0.34	Häuselberg, Hesse.	Surv. lab.	G. Klemm, Erl. G. Kt. Hes., Bl. Birkenau, p. 33, 1905.	Granite.	
7	I.''2.1.1(2).	Q 57.30 hy 4.56 or 21.68 mt 1.86 ab 2.62 ap 0.67 C 9.08	Kupferberg, Harz.	K. Eyme.	O. H. Erdmanns- doerfer, Jb. Pr. G. L.-A., XXXII, (2), p. 185, 1912.	Quartz-mica rock.	Border of granite.
8	I.''2.''2.''2.	Q 57.42 hy 3.82 or 16.68 mt 3.02 ab 6.81 an 6.12 C 6.12	Radomiltz, n. Budweis, Bohemia.	C. v. John.	C. v. John, Jb. G. R.-A., Wien, p. 473, 1889.	Moldavite.	Meteoric? Not in W. T.
9	I.2.2.1.⊙	Q 65.40 hy 5.53 or 15.57 mt 0.23 ab 0.52 an 2.50 C 9.59	Mount Bischoff, Tasmania.	H. Sommerlad.	A. v. Groddeck, Z. D. G. G., XXXIX, p. 80, 1887.	Porphyry.	In W. T., p. 123.

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

CLASS I. PERSALANE—Continued.

RANG 1-2. PREALKALIC. DARGASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	81.43	13.70	1.58	n. d.	0.06	0.37	1.02	1.28	0.92						100.36	
A4. IV	1.357	.134	.010	(.020)	.002	.006	.016	.014								
2	80.36	11.12	1.77	n. d.	0.56	0.67	1.82	2.47	1.96						100.73	
A3. III	1.339	.109	.011	(.022)	.014	.012	.030	.026								
3	82.61	8.30	2.54	0.45	n. d.	0.26	1.44	2.98	0.75		0.20				99.53	
A3. III	1.377	.081	.016	.006	—	.005	.023	.032			.003					

RANG 1-2. PREALKALIC. DARGASE.

1	84.15	9.67	0.51	0.07	0.04	0.53	2.65	1.57	0.74	0.21	trace		trace	F SrO	0.02 trace	100.14	
A3. III	1.403	.095	.003	.001	.001	.010	.043	.017			—		—				
2	76.71	12.81	0.80	1.72	0.40	1.90	1.76	1.48	0.77	0.33	0.14	0.48	0.27	ZrO ₂ S	0.03 0.06	99.66	2.613
A1. I	1.279	.126	.005	.024	.010	.034	.028	.016				.002	.003	.004			
3	74.89	15.11	1.06	2.26	0.82	1.67	2.06	0.73	0.50	0.31		0.27	0.22			99.90	
A2. II	1.248	.148	.007	.031	.021	.030	.033	.008				.002	.003				

RANG 3. ALKALICALCIC.

1	80.55	9.87	2.13	n. d.	0.81	2.21	0.42	2.43	1.06							99.48
A4. IV	1.343	.096	.013	(.026)	.020	.039	.007	.025								
2	82.68	9.56	n. d.	1.13	1.52	2.06	0.63	2.28	n. d.				0.18			100.04
A4. IV	1.378	.094	—	.015	.038	.037	.010	.024					.003			
3	82.28	10.08	n. d.	2.03	0.98	2.24	0.28	2.20	0.06				—			100.15
A4. IV	1.371	.099	—	.028	.025	.040	.005	.023								
4	78.61	12.01	0.16	3.09	1.39	1.62	0.44	3.06	n. d.				0.11			100.49
A3. III	1.310	.118	.001	.043	.035	.029	.007	.033					.002			
5	77.96	12.20	0.14	3.36	1.48	1.94	0.61	2.70	n. d.				0.10			100.49
A3. III	1.299	.120	.001	.047	.037	.035	.010	.029					.001			

RANG 3. ALKALICALCIC.

1	77.6	11.2	1.8	1.2	1.7	2.0	1.3	2.0	0.9						99.7
B3. IV	1.293	.110	.011	.017	.043	.036	.021	.021							

ORDER 2. DOQUARIC. BELGARE—Continued.

SUBBRANG 3. SODIPOTASSIC. CARDIFFOSE. (ADAMS AND BARLOW, 1910.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I.2''2.3.	Q 68.58 hy 2.84 or 7.78 ab 8.38 an 1.67 C 10.00	Pine Lake, Cardiff Township, Ontario.	N. N. Evans.	F. D. Adams, B. G. S. A., IX, p. 169, 1898.	Nodule in granite.	Also in Can. G. S., Mém. 6, p. 134, 1910. Cf. No. 1, I.3.1.2. In W. T., p. 123.
2	I.2(3)''2.3.	Q 56.58 hy 4.30 or 14.46 ab 15.72 an 3.34 C 4.18	Grainsgill, Carrock Fell, England.	L. J. Spencer.	A. Harker, Q. J. G. S., LI, p. 141, 1895.	Greisen.	In W. T., p. 123.
3	I.2''1''''3.	Q 62.22 mt 0.70 or 17.79 il 0.46 ab 12.05 hm 2.08 an 1.39 C 2.14	Chemin Auriasque, Esterel, France.	Pisani.	A. Michel Levy, B. Soc. G. Fr., XXI, p. 130, 1912.	Porphyry.	

SUBBRANG 4-5. PRESODIC.

1	I.2(3).(1)2.4.	Q 61.38 hy 0.10 or 9.45 mt 0.53 ab 22.53 hm 0.32 an 2.78 C 2.55	Belmont, Nevada.	H. N. Stokes.	J. E. Spurr, A. J. S., X, p. 358, 1900.	Beresite.	In W. T., p. 375.
2	I.2(3).2(3).(3)4.	Q 56.16 hy 3.77 or 8.90 mt 1.16 ab 14.67 il 0.30 an 6.67 ap 1.01 C 5.92	Koshinzan, Sumiyoshi, Settsu, Japan.	N. Yoshida.	S. Kozu, pers. com.	Granite.	
3	I''2''2(3)4.	Q 54.48 hy 5.66 or 4.45 mt 1.62 ab 17.29 ap 0.67 an 6.39 C 8.57	Ballandean, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1912.	Granite.	H. C. Richards, pers. com.

SUBBRANG 1-2. PREPOTASSIC.

1	I.2''3.2.	Q 61.62 hy 5.43 or 13.90 ab 3.67 an 10.84 C 2.55	Garrarus, County Waterford, Ireland.	Jones and Robinson.	F. W. C. Reed, Q. J. G. S., LVI, p. 679, 1900.	Felsite.	In W. T., p. 123.
2	I.2''3.2.	Q 62.64 hy 6.18 or 13.34 ab 5.24 an 10.29 C 2.35	Budweis, Bohemia.	C. v. John.	C. v. John, Vh. G. R.-A. Wien, 1899, p. 179.	Moldavite.	Meteoritic? Not in W. T.
3	I.2.3''''2.	Q 64.26 hy 6.20 or 12.79 ab 2.62 an 11.12 C 3.16	Radomiltz, n. Budweis, Bohemia.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, 1889, p. 473.	Moldavite.	Meteoritic? Not in W. T.
4	I(II).2(3)''3''2.	Q 55.98 hy 9.31 or 18.35 mt 0.23 ab 3.67 an 8.06 C 5.00	Trebitsch, Bohemia.	C. v. John.	C. v. John, Vh. G. R.-A., Wien, 1899, p. 179.	Moldavite.	Meteoritic? Not in W. T.
5	I(II).2(3).3.2.	Q 54.66 hy 9.90 or 16.12 mt 0.23 ab 5.24 an 9.73 C 4.69	Trebitsch, Bohemia.	C. v. John.	C. v. John, Vh. G. R.-A., Wien, 1899, p. 179.	Moldavite.	Meteoritic? Not in W. T.

SUBBRANG 3. SODIPOTASSIC.

1	I''2(3).3.3.	Q 55.20 hy 5.09 or 11.68 mt 2.55 ab 11.00 an 10.01 C 3.26	Sturmhaube Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 115, 1902.	Granite.	
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CLASS I. PERSALANE—Continued.

RANG 4. ALKALICALCIC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	77.21	15.38	0.72	0.93	0.42	2.18	2.26	0.50	0.39	0.02					100.01	
A3. III	1.287	.151	.004	.013	.011	.039	.036	.005								

RANG 4. DOCALCIC.

1	77.75	12.90	n. d.	2.60	0.22	3.05	0.26	2.58	0.06						99.46	
A4. IV	1.296	.126	—	.036	.006	.055	.004	.028								

RANG 4. DOCALCIC.

1	77.52	16.78	n. d.	0.84	0.32	2.56	1.21	0.62	0.33						100.18	
A4. IV	1.292	.165	—	.012	.008	.046	.019	.007								

CLASS I. PERSALANE.

RANG 1. PERALKALIC. ALASKASE. (C. I. P. W., 1902.)

1	76.81	10.96	1.18	0.08	0.14	none	0.26	8.50	1.17	0.48	0.13	trace	none		99.71	
A2. II	1.280	.107	.008	.001	.004	—	.004	.090			.002	—	—			
2	76.77	12.63	1.13	0.27	0.07	0.21	0.30	6.43	1.55	0.49	0.18	0.04	none		100.07	
A2. II	1.280	.124	.007	.004	.002	.004	.005	.068			.002	—	—			
3	79.19	9.88	0.21	0.63	0.55	none	0.66	7.68	0.54	0.03	none	none	none	CO ₂ 0.64	100.01	
A2. II	1.320	.097	.001	.009	.014	—	.011	.082			—	—	—			
4	78.11	11.50	1.60	n. d.	0.25	0.51	0.54	6.26	1.90		0.08				100.75	
A4. IV	1.302	.113	.010	[.020]	.006	.009	.009	.067			.001					
5	77.90	11.61	0.86	n. d.	0.75	0.42	0.47	7.20	1.76						100.97	
A4. IV	1.298	.114	.005	[.010]	.019	.007	.008	.077								
6	75.71	13.50	0.85	n. d.	1.02	0.64	0.38	5.75	2.37						100.22	
A4. IV	1.262	.132	.005	[.010]	.026	.011	.006	.062								
7	72.92	13.70	0.93	1.10	0.25	0.29	0.19	9.10	0.69		0.36		0.25		99.78	
A2. II	1.215	.134	.006	.015	.006	.005	.003	.097			.005		.003			
8	82.59	9.81	0.10	0.42	0.20	0.17	0.49	5.86	0.23		0.13			CO ₂ 0.05 SO ₂ 0.05 Org. 0.07	100.17	2.641
A2. II	1.377	.096	.001	.006	.005	.003	.008	.063			.001					
9	78.16	11.01	0.10	0.63	0.15	0.30	0.36	7.97	0.17	0.21	0.32	0.07	trace	CO ₂ none ZrO ₂ none SO ₂ none Cl 0.04 FeS ₂ 0.45 Cr ₂ O ₃ none NiO none BaO 0.18 SrO none CuO trace	100.12	2.589
A1. I	1.303	.109	.001	.009	.004	.005	.006	.085			.004	—	—			

ORDER 2. DOQUARIC. BELGARE—Continued.

SUBRANG 4-5. PRESODIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I.2(3).3.(4)5.	Q 56.58 hy 2.29 or 2.78 mt 0.93 ab 18.86 an 10.84 C 7.24	Bagan, Luzon, Philippine Islands.	Govt. lab.	A. J. Eveland, Min. Bureau Manila. B. 4, p. 41, 1905.	Granite.	

SUBRANG 1-2. PREPOTASSIC.

1	I.2(3).(3)4.(1)2.	Q 57.12 hy 5.35 or 50.04 il 0.30 ab 2.10 an 15.29 C 3.98	Radomiltz, n. Budweis, Bohemia.	C. v. John.	C. von John, Jb. G. R.-A. Wien, 1889, 473.	Moldavite.	Igneous? Not in W. T.
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SUBRANG 4-5. PRESODIC.

I	I.2.(3)4.4.	Q 61.44 hy 2.38 or 3.89 ab 9.96 an 12.79 C 9.49	Bethel, Vermont.	C. F. McKenna	T. N. Dale, U. S. G. S. B. 404, p. 111, 1909.	Granite.	
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ORDER 3. QUARFELIC. COLUMBARE. (C. I. P. W., 1902).

SUBRANG 1. PERPOTASSIC. BISBOSE. (H. S. WASHINGTON, 1916.)

1	I.3.1.1.⊙	Q 42.72 hy 0.40 or 50.04 il 0.30 ab 2.10 hm 1.18 C 1.33	Near Waco Junction, Bisbee Quad- rangle, Arizona.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 21, p. 77, 1904.	Granite porphyry.	Also in U.S.G.S. Fol. 112, p. 7, 1904.
2	I.3.1.1''.	Q 49.92 hy 0.20 or 37.81 mt 0.46 ab 2.62 il 0.30 an 1.11 hm 0.80 C 4.79	Jarbridge District, Nevada.	G. Steiger.	F. C. Schrader, U. S. G. S. rec. lab.	Rhyolite.	
3	I.3.1.1(2).	Q 44.40 hy 2.46 or 45.59 mt 0.23 ab 5.76 C 0.41	Bahia Rodriguez, Skiyring Water, Patagonia.	M. Dittrich.	P. Quensel, B. G. Inst. Ups., XII, p. 28, 1913.	Felsite porphyry.	"Very fresh."
4	I.3.1(2).1(2).	Q 48.18 hy 3.11 or 37.25 il 0.15 ab 4.72 an 2.50 C 3.06	Col des Sacs, Esterel, France.	Pisani.	A. Michel-Levy, B. Serv. Cte. G. Fr., XXI, No. 130, p. 40, 1912.	Pyromeride.	
5	I.3.1''1(2).	Q 44.70 hy 3.22 or 42.81 ab 4.19 an 1.95 C 2.24	Villetelle, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr. XI, No. 83, p. 76, 1902.	Quartz porphyry.	
6	I.3.1.1''.	Q 47.76 hy 3.92 or 34.47 ab 3.14 an 3.06 C 5.41	Gueret, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Porphyry.	
7	I.3(4).1.1.	Q 35.52 hy 1.52 or 53.93 mt 1.39 ab 1.57 il 0.76 an 1.39 C 2.96	Suppatsch, Jukkasjarvi, Lapland.	H. Santesson.	F. Svenonius, Sver. G. Unds., No. 183, p. 15, 1900.	Porphyry.	Not in W. T.
8	I.''3.1.1(2).	Q 56.46 hy 1.16 or 35.03 mt 0.23 ab 4.19 ap 0.34 C 2.55	Wormkethal, Brocken, Harz.	Pufahl.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXVII, p. 352, 1906.	Porphyroid.	Border of gran- ite.
9	I. 3.1.1''.	Q 44.34 hy 0.93 or 47.26 mt 0.23 ab 3.14 il 0.61 an 1.39 C 1.33	Bee Mountain Gap, Cobar, New South Wales.	W. A. Greig.	E. C. Andrews, N. S. W. G. S., Min. Res. No. 17, p. 65, 1913.	Quartz- orthoclase porphyry.	

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	78.83	10.88	1.63	n. d.	0.35	0.22	2.13	5.31	0.32						99.67	
A4. IV	1.314	.106	.010	(.020)	.009	.004	.034	.057								
2	79.75	10.47	0.64	0.92	0.13	0.15	1.36	6.01	0.60	0.08	0.15	trace	trace	ZrO ₂ 0.05 S none NiO none BaO 0.06 SrO trace Li ₂ O trace	100.37	
A1. I	1.329	.103	.004	.013	.003	.003	.022	.064			.002	—	—			
3	76.10	12.95	0.65	0.09	0.14	0.12	2.36	6.50	0.48	0.17	0.07	0.02	trace	CO ₂ none NiO none	99.65	
A2. II	1.268	.127	.004	.001	.004	.002	0.38	0.89			.001	—	—			
4	75.67	12.43	2.27	0.15	none	trace	2.01	6.73	0.41				trace		99.67	
A3. III	1.261	.122	.014	.002	—	—	.032	.071					—			
5	77.36	11.37	0.31	0.36	0.14	0.30	1.38	7.28	0.26	0.55	0.16	0.03	0.03	CO ₂ 0.06 S 0.33 Cr ₂ O ₃ none BaO 0.05	99.97	
A1. I	1.289	.111	.002	.005	.004	.005	.023	.078			.002	—	—			
6	75.39	13.65	0.38	0.18	0.15	0.51	1.84	6.81	1.13		trace	trace	0.14		100.18	
A2. II	1.257	.134	.002	.003	.004	.009	.030	.072			—	—	.002			
7	74.72	12.80	0.59	0.83	0.04	0.62	2.20	6.32	0.94	0.55	0.44	0.02	0.13	CO ₂ 0.21 ZrO ₂ 0.02 S 0.02 BaO 0.01 SrO 0.01	100.47	
A1. I	1.245	.125	.004	.011	.001	.011	.035	.067			.006	—	.002			
8	74.40	14.43	0.22	0.89	0.07	0.58	1.76	6.56	0.92	0.15	0.12	0.22	trace	F 0.04 BaO trace SrO none Li ₂ O trace	100.36	
A2. II	1.240	.142	.001	.012	.002	.010	.028	.070			.002	.002	—			
9	73.23	12.73	0.99	0.16	0.22	0.61	1.91	5.17	4.51	0.53	0.09	0.02	trace	BaO 0.02 SrO none	100.19	
A2. II	1.221	.125	.006	.002	.006	.011	.030	.056			.001	—	—			
10	76.71	11.68	1.01	1.50	0.16	0.44	0.80	6.65	0.61				0.09		99.65	
A3. III	1.279	.115	.006	.021	.004	.008	.013	.071					.001			
11	77.10	10.64	1.55	n. d.	1.05	none	0.64	5.98	2.50						99.46	
A4. IV	1.285	.104	.010	(.020)	.028	—	.010	.064								
12	76.40	10.60	1.40	n. d.	0.38	none	2.57	7.45	1.60		0.06				100.46	
A3. III	1.273	.104	.009	—	.010	—	.042	.080			.001					
13	76.25	11.10	1.68	0.45	0.26	0.39	1.16	7.85	1.00		0.13				100.27	
A3. III	1.271	.109	.011	.006	.007	.007	.019	.084			.002					
14	75.90	11.43	1.70	0.30	0.26	none	2.47	6.40	0.89		0.06				99.41	
A3. III	1.265	.112	.011	.004	.007	—	.040	.068			.001					
15	79.21	9.93	0.98	trace	0.40	0.10	2.05	5.25	1.51						99.43	
A30. III	1.320	.097	.006	—	.010	.002	.033	.056								
16	75.69	11.64	1.30	0.84	0.20	0.75	2.42	6.16	0.66		0.16	0.04	0.21		100.07	
A2. II	1.262	.114	.008	.012	.005	.014	.039	.066			.002	—	.003			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 2. DOPOTASSIC. MAGDEBURGOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I.3.1.2(3).	Q 43.86 hy 3.54 or 31.99 ab 17.82 an 1.11 C 1.12	Pine Lake, Ontario.	Norton-Evans.	F. D. Adams, B. G. S. A., IX, p. 169, 1898.	Granite.	Cf. No. 1. I.2.2.3. In W. T., p. 125.
2	I.3.1.2.⊙	Q 47.82 hy 1.22 or 35.58 mt 0.93 ab 11.53 il 0.30 an 0.83 C 1.43	Blowing Rock, Watauga County, North Carolina.	W. F. Hille- brand.	T. L. Watson, J. G., XII, p. 223, 1904.	Quartz porphyry.	Also in U. S. G. S. B. 168, p. 52, 1900. In W. T., p. 125.
3	I.3(4).1.2(3).	Q 37.08 hy 0.40 or 38.36 il 0.15 ab 19.91 hm 0.65 an 0.56 C 1.84	Felch Mountain, Michigan.	H. N. Stokes.	H. L. Smyth, U. S. G. S. Mon. 36, p. 389, 1899.	Granite.	In W. T., p. 125.
4	I.3''.1.2.	Q 38.58 mt 0.46 or 39.48 hm 1.92 ab 16.77 C 1.94	Little Montreal River, Keweenaw Point, Michigan.	F. P. Burrall.	L. L. Hubbard, Mich. G. S., VI, pt. 2, p. 28, 1898.	Felsite.	Not in W. T.
5	I.3''.1.2.	Q 40.08 hy 0.53 or 43.37 mt 0.46 ab 12.05 il 0.30 an 1.39 C 0.51	Bachelor Mine, Creede, Colorado.	W. C. Wheeler.	W. H. Emmons, U. S. G. S. Rec. lab.	Rhyolite.	
6	I.3(4).1''.2.	Q 37.38 hy 0.40 or 40.03 mt 0.23 ab 15.72 il 0.30 an 2.50 hm 0.16 C 2.35	Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, II, p. 324, 1896.	Rhyolite.	In W. T., p. 125.
7	I.3(4).1(2).2''.	Q 36.42 hy 0.50 or 37.25 mt 0.93 ab 18.34 il 0.91 an 3.06 C 1.22	Lake Fork; San Cristobal quad- rangle, Colorado.	R. C. Wells.	W. Cross, U. S. G. S. rec. lab.	Rhyolite.	
8	I.3''.1.2.	Q 38.10 hy 1.39 or 38.92 mt 0.23 ab 14.67 il 0.30 an 0.83 ap 0.67 C 4.18	Currant Creek, Pikes Peak, Colorado.	W. F. Hille- brand.	E. B. Mathews, U. S. G. S. B. 148, p. 160, 1897.	Granite (sheared).	In W. T., p. 125.
9	I.3.1(2).2(3).	Q 40.62 hy 0.60 or 31.14 mt 0.23 ab 15.72 il 0.15 an 3.06 hm 0.80 C 2.96	Buena Vista Peak, Amador County, California.	W. F. Hille- brand.	H. W. Turner, J. G., III, p. 407, 1897.	Rhyolite.	Also in U. S. G. S. A. R. 17, II, p. 721, 1896. In W. T., p. 125.
10	I.3.1''.(1)2.	Q 44.34 hy 2.51 or 39.48 mt 1.39 ab 6.81 an 2.22 C 2.35	Banavie, Argyllshire, Scotland.	G. Wilson.	G. S. Un. K., Sum. Prog., 1898, p. 43.	Granite.	Not in W. T.
11	I.3.1.(1)2.	Q 47.70 hy 5.24 or 35.58 ab 5.24 C 3.06	Collet Redon, Esterel, France.	Pisani.	A. Michel Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 40, 1912.	Pitchstone.	
12	I.3(4).1.2.	Q 35.82 ac 3.70 or 44.48 ns 1.22 ab 12.58 hy 1.00 il 0.15	Colle de la Motte, Esterel, France.	Pisani.	A. Michel Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 41, 1912.	Pitchstone.	
13	I.3(4).1''.2.	Q 37.98 di 0.22 or 46.70 hy 0.60 ab 9.96 mt 0.93 an 1.67 il 0.30 hm 1.06	Mont Vinaigre, Esterel, France.	Pisani.	A. Michel Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 40, 1912.	Porphyry.	
14	I.3(4).1.2(3).	Q 36.60* hy 0.70 or 37.81 mt 0.70 ab 20.96 il 0.15 C 0.41 hm 1.28	Mont Vinaigre, Esterel, France.	Pisani.	A. Michel Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 44, 1912.	Pyromeride.	
15	I.3.1.2(3).	Q 46.32 hy 1.00 or 31.14 hm 0.98 ab 17.29 an 0.56 C 0.61	Monte Tombalo, Kruzzino, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 59, 1907.	Rhyolite.	
16	I.3(4).1''.2(3).	Q 35.94 di 1.18 or 36.70 hy 0.56 ab 20.44 mt 1.86 an 2.50 il 0.30	Vegagatan, Göteborg, Sweden.	Mauzelius and Berg.	P. J. Holmquist, B. Un. Ups., VII, p. 268, 1906.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
17	75.34	12.51	0.62	1.52	0.20	0.40	2.00	6.55	0.36		0.15		0.23		99.88	
A2. II	1.256	.123	.004	.021	.005	.007	.032	.070			.002		.003			
18	76.43	11.69	0.57	0.62	0.30	trace	1.62	6.96	0.84		trace	0.09		CO ₂ 0.08 SO ₃ 0.10	99.30	2.600
B2. III	1.274	.114	.004	.008	.008	—	.026	.074			—	—				
19	76.06	11.36	2.23	n. d.	0.12	0.58	1.17	7.27	0.90		0.12				99.81	2.613
A4. IV	1.268	.111	.014	(.028)	.003	.010	.019	.078			.002					
20	76.80	10.77	1.32	0.05	0.18	0.55	2.00	6.99	0.98		0.17			CO ₂ 0.08	99.98	2.559
A3. III	1.280	.106	.008	.001	.005	.010	.032	.074			.002					
21	75.76	12.68	0.49	0.99	0.14	0.49	1.11	7.42	0.62			0.07		SO ₃ 0.38	100.15	2.615
A3. III	1.263	.124	.003	.014	.004	.009	.018	.079			—					
22	75.25	12.25	1.45	0.50	0.25	0.30	2.20	5.67	0.64	0.47	0.82	0.12			99.92	
A2. II	1.254	.120	.009	.007	.006	.005	.035	.061			.010	.001				
23	75.16	10.50	3.19	0.45	0.72	0.10	0.78	6.52	1.20	1.03	0.30	0.06			100.01	
A2. II	1.263	.103	.020	.006	.018	.002	.013	.069			.004	—				
24	76.44	12.39	0.20	1.80	0.32	0.46	0.63	6.52	1.09						99.85	
A3. III	1.274	.121	.001	.025	.008	.008	.010	.069							(100.10)	
25	75.57	12.74	0.49	1.39	1.01	0.23	1.96	5.56	0.67					CO ₂ 0.07	99.69	
A3. III	1.280	.125	.003	.019	.025	.004	.032	.060								
26	75.41	13.81	0.34	1.22	trace	0.67	1.20	6.42	0.44					Li ₂ O 0.21	99.72	
A3. III	1.257	.135	.002	.017	—	.012	.019	.068								
27	80.94	10.05	0.50	0.47	0.10	0.30	1.73	5.08	0.85						100.02	
A3. III	1.349	.098	.003	.007	.003	.005	.027	.054								
28	77.46	9.36	1.50	0.85	0.12	0.17	1.36	5.15	3.40		trace				99.37	
A3. III	1.291	.092	.009	.012	.003	.003	.022	.055								
29	78.64	9.85	0.54	2.00	0.10	0.80	2.03	5.16	0.40	0.14	0.67	trace			100.33	
A2. II	1.311	.097	.003	.028	.003	.014	.032	.055			.003					
30	77.82	11.46	0.30	0.09	0.23	0.22	0.86	7.19	1.40	0.36	0.02	0.04	trace	CO ₂ 0.02 SO ₃ 0.07 BaO 0.02 Li ₂ O trace	100.11	2.596
A1. I	1.297	.112	.002	.001	.006	.004	.014	0.77			—	—	—			
31	77.39	9.50	0.30	1.08	0.17	0.42	1.72	6.54	2.14	0.08	0.45	0.06	trace	CO ₂ trace ZrO ₂ none C trace S none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.04 SrO none	99.89	2.625
A1. I	1.290	0.93	.002	.015	.004	.007	.027	.069			.006	—	—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 2. DOPOTASSIC. MAGDEBURGOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
17	I.3(4).1''.2''.	Q 36.42 hy 2.88 or 38.92 mt 0.93 ab 16.77 il 0.30 an 1.95 C 1.43	Johanniskirche, Göteborg, Sweden.	E. Östlund.	P. J. Holmquist, B. Un. Ups., VII, p. 268, 1906.	Granite.	
18	I.3''.1.2.	Q 39.72 hy 1.33 or 41.14 mt 0.93 ab 13.62 C 1.43	Alvensleben, n. Magdeburg, Russia.	Hampe.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 192, 1892.	Quartz porphyry.	In W. T., p. 125.
19	I.3(4).1(2).2.	Q 38.10 hy 4.00 or 43.37 ab 9.96 an 2.78 C 0.41	Klinznerberg, n. Magdeburg, Saxony.	Bodländer.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 180, 1892.	Quartz porphyry.	In W. T., p. 125.
20	I.3(4).1.2.	Q 37.74 di 1.08 or 41.14 wo 0.46 ab 16.77 il 0.15 hm 1.32 tn 0.20	Hazelberg, n. Ammelshain, Saxony.	C. Ambronn.	C. Ambronn, In. Diss. Leipz., p. 56, 1907.	Schlieren in porphyry.	
21	I.3''.1''.2.	Q 38.88 hy 1.85 or 43.92 mt 0.70 ab 9.43 an 2.50 C 1.84	Eckerthal, Brocken, Harz.	Eyme.	O. H. Erdmanns- doerfer. Jb. Pr. G. L.-A., XXVII, p. 345, 1906.	Granite (aplitic).	
22	I.3''.1.2(3).	Q 40.08 hy 0.60 or 33.92 il 1.06 ab 18.34 hm 1.45 an 0.56 ru 0.24 C 2.24 ap 0.34	Ampanobé, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Rhyolite.	
23	I.3.1''.2.	Q 44.34 hy 1.80 or 38.36 mt 0.46 ab 6.81 il 0.61 an 0.56 hm 2.88 C 1.94	Mount Ivohitsombé, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Rhyolite.	
24	I.3.1''.(1)2.	Q 45.12 hy 3.97 or 38.36 mt 0.23 ab 5.24 an 2.22 C 3.47	Bolshoj Pit River, Jenissei District, Siberia.	A. Nikitinsky.	A. Meister, Reg. Aurif. Siber., IX, p. 245, 1910.	Granite.	
25	I.3''.1.2''.	Q 39.54 hy 4.61 or 33.36 mt 0.70 ab 16.77 an 1.11 C 2.96	Bolshoj Pit River, Jenissei District, Siberia.	N. Podkopajev.	A. Meister, Reg. Aurif. Siber., IX, p. 245, 1910.	Granite.	
26	I.3.1(2).2.	Q 41.76 hy 1.98 or 37.81 mt 0.46 ab 9.96 an 3.34 C 3.67	Angara River, Jenissei District, Siberia.	A. Karpov.	A. Meister, Reg. Aurif. Sib., IX, p. 193, 1910.	Granite.	Border of dike. Cf. No. 257, I.4.1.3.
27	I.3.1.2''.	Q 50.76 hy 0.83 or 30.02 mt 0.70 ab 14.15 an 1.39 C 1.22	Taisoni River, Hitou, Ambon Island, Moluccas.	D. Funk.	R. D. M. Verbeek, Jaarb. Mijnw., XXXIV, p. 181, 1905.	Quartz porphyry.	
28	I.3.1.2.⊙	Q 49.02 hy 0.70 or 30.58 mt 2.09 ab 11.53 an 0.83 C 1.22	Leitimor, Ambon Island, Moluccas.	O. Brunck.	R. D. M. Verbeek, Jb. Mijnw., XXXIV, p. 85, 1905.	Quartz porphyry.	
29	I.3.1(2).2(3).	Q 44.70 di 0.96 or 30.58 hy 2.05 ab 16.77 mt 0.70 an 2.78 il 1.22	Mount Wellington, N. Gippsland, Victoria.	Ampt.	E. O. Thiele, Pr. R. Soc. Vict., XXI, p. 266, 1908.	Rhyolite.	
30	I.3.1.(1)2.	Q 44.22 hy 0.60 or 42.81 mt 0.23 ab 7.34 hm 0.16 an 1.11 C 1.73	Mount Bright, Pokolbin, New South Wales.	J. C. H. Min- gay.	Browne and Walker, Proc. R. Soc. N. S. W., XLIV, 398, 1911.	Rhyolite.	
31	I.3.1.2.⊙	Q 42.18 ac 0.92 or 38.36 ns 0.12 ab 12.68 di 1.67 hy 0.73 il 0.91	Canbelego, New South Wales.	H. P. White.	G. W. Card, pers. com.	Rhyolite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	75.62	11.02	3.17	1.29	0.26	0.58	3.11	5.33	0.10		0.16		0.12		100.76	2.59
A2. II	1.260	.108	.020	.018	.007	.010	.050	.056			.002		.002			
2	77.28	11.24	1.74	none	0.21	trace	3.10	4.55	1.16		trace	0.02		CO ₂ 0.17	99.47	
B2. III	1.288	.110	.011	—	.005	—	.050	.049			—	—				
3	78.37	10.85	1.33	0.44	none	0.40	2.68	5.52	0.59	0.04			0.06		100.28	2.614
A3. III	1.306	.106	.008	.006	—	.007	.044	.059					—			
4	76.37	12.15	1.65	1.06	0.10	0.17	3.64	4.68	0.08	0.13	0.18		0.07		100.28	2.645
A2. II	1.273	.119	.010	.015	.003	.003	.059	.050			.002		.001			20°
5	76.41	12.41	1.01	0.50	0.46	0.78	3.34	4.33	0.34	0.13	0.03	none	0.06	ZrO ₂ 0.02 Cl none F 0.01 S 0.01 BaO none	99.84	
A1. I	1.274	.122	.006	.007	.012	.014	.054	.046			—		.001			
6	74.36	12.75	2.09	1.35	0.11	0.82	3.44	3.76	0.20		0.45	0.26	0.04	CO ₂ 0.02 ZrO ₂ 0.04 SO ₃ 0.09 BaO 0.09	99.86	
A1. I	1.239	.125	.013	.019	.003	.014	.055	.040			.006	.002	—			
7	77.13	10.65	2.85	0.39	trace	0.08	3.29	4.66	0.13	0.06	0.22	trace	0.33	CO ₂ 0.12	99.91	
A2. II	1.286	.104	.018	.005	—	.001	.053	.050			.003		.005			
8	76.06	11.24	1.97	1.36	none	0.58	2.80	4.95	0.22	0.37	0.30	trace	0.20		100.05	
A2. II	1.268	.110	.012	.019	—	.010	.050	.053			.004		.003			
9	75.85	11.39	3.10	0.40	0.14	trace	2.73	5.50	none	0.20	0.30	0.10	0.01	CO ₂ 0.14	99.86	
A2. II	1.264	.112	.019	.006	.004		.044	.059			.004	.001	—			
10	74.87	14.27	trace	0.51	0.16	0.48	3.06	5.36	0.66	0.26	0.05	0.21	trace	Li ₂ O trace	99.89	
A2. II	1.248	.140	—	.007	.004	.009	.049	.058			—	.001				
11	79.57	11.41	0.20	0.70	trace	0.21	3.46	3.52	0.61	0.18	0.11	trace	none	BaO 0.05 SrO trace	100.02	
A1. I	1.326	.112	.001	.010	—	.003	.056	.037	0.18			—	—			
12	78.23	11.11	1.73	1.03	trace	0.28	3.44	4.08	0.15	0.10					100.15	
A3. III	1.304	.109	.011	.014	—	.005	.055	.044							(100.05)	
13	74.62	10.01	3.85	1.72	0.33	2.43	3.33	3.38	0.24						99.91	
A3. III	1.244	.098	.024	.024	.008	.043	.053	.036								
14	77.05	12.84	0.56	0.14	trace	0.57	2.81	5.52	0.48	0.22	0.12	none	none	BaO none SrO none Li ₂ O trace	100.31	
A1. I	1.284	.126	.004	.002	—	.010	.045	.059			.002	—	—			
15	76.87	12.52	0.67	none	0.09	0.49	2.47	5.78	0.52	0.25	0.11	0.05	trace	Cl none BaO none SrO none Li ₂ O trace	99.82	
A1. I	1.281	.123	.004	—	.002	.009	.040	.062			.001	—	—			
16	77.65	11.50	1.21	0.26	none	0.59	3.33	4.83	0.20	0.08	0.14	0.02	none	CO ₂ none ZrO ₂ 0.03 SO ₃ none	99.84	
A1. I	1.294	.113	.008	.004	—	.011	.053	.051			.002	—	—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODIPOTASSIC. ALASKOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I''3(4).1.3.	Q 35.52 di 1.83 or 31.14 mt 3.71 ab 27.25 il 0.30 an 0.56 hm 0.04	Sudbury, Ontario.	J. Horton.	A. P. Coleman, J. G., XV, p. 776, 1907.	Granite.	
2	I.3''.1.3.	Q 41.34 hy 0.50 or 27.24 hm 1.74 ab 26.20 C 1.12	Fox Islands, Maine.	Magruder and Jones.	G. O. Smith, In. Diss. Johns Hop- kins Univ., p. 51, 1896.	Aporhyolite.	In W. T., p. 127.
3	I.3''.1.''3.	Q 40.68 di 0.46 or 32.80 mt 1.39 ab 23.06 hm 0.32 an 0.83	Mount Kearsarge, New Hampshire.	J. H. Perry.	J. H. Perry, J. G., XI, p. 408, 1903.	Quartz-por- phyry.	
4	I.3(4).1.3.	Q 36.36 hy 0.83 or 27.80 mt 2.32 ab 30.92 il 0.30 an 0.83 C 0.71	Wampatuck Hill, Blue Hills, Massachusetts.	C. H. Warren.	C. H. Warren, Proc. Am. Ac. Sci. Phila., XLIX, p. 289, 1913.	Aporhyolite.	
5	I.3(4).1(2).3.	Q 38.16 hy 1.46 or 25.58 mt 1.39 ab 28.30 an 3.89 C 0.82	Long Lake, Adirondack Mountains, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R., LX, (2), p. 511, 1907.	Granite.	
6	I.3''.1.''3''.	Q 39.12 hy 0.30 or 22.24 mt 3.02 ab 28.82 il 0.91 an 1.95 ap 0.67 C 2.35	Haskell, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1908) 1909, p. 67.	Granite gneiss.	
7	I.3''.1.3.	Q 39.96 mt 1.62 or 27.80 il 0.46 ab 27.77 hm 1.67 an 0.28	South Mountain, Fairfield quad- rangle, Pennsyl- vania.	W. T. Schaller.	F. Bascom, U. S. G. S. rec. lab.	Aporhyolite.	
8	I.3(4).1''3.	Q 37.62 di 0.75 or 29.47 hy 0.40 ab 26.20 mt 2.78 an 1.95 il 0.61	South Mountain, Fairfield County, Pennsylvania.	G. Steiger.	F. Bascom, U. S. G. S. rec. lab.	Aporhyolite.	
9	I.3''.1.''3.	Q 38.52 hy 0.40 or 32.80 mt 0.70 ab 23.06 il 0.61 C 0.92 hm 2.43 ap 0.34	South Mountain, Fairfield quad- rangle, Pennsyl- vania.	W. T. Schaller.	F. Bascom, U. S. G. S. rec. lab.	Aporhyolite.	
10	I.3(4).1.3.	Q 34.98 hy 1.23 or 32.24 ap 0.34 ab 25.67 an 1.67 C 2.75	Brookville, Montgomery County, Mary- land.	W. F. Hille- brand.	G. H. Williams, U. S. G. S. A. R. 15, p. 672, 1895.	Granite.	In W. T., p. 147.
11	I.3.1.3(4).	Q 45.24 hy 1.06 or 20.57 mt 0.23 ab 29.34 il 0.15 an 0.83 C 1.63	Sam Christian Mine, Montgomery County, North Carolina.	W. F. Hille- brand.	J. S. Diller, A. J. S., VII, p. 341, 1899.	Rhyolite.	In W. T., p. 127.
12	I.3''.1.3.	Q 41.82 hy 0.40 or 24.46 mt 2.55 ab 28.82 an 1.39 C 0.51	Taylor's farm, Fox River Valley, Wisconsin.	W. W. Daniells.	Hobbs and Leith, Un. Wisc. B. 158, p. 262, 1907.	Soda apo- rhyolite.	
13	I(II).3.1(2).3(4).	Q 39.00 di 1.73 or 20.02 wo 3.02 ab 27.77 mt 5.57 an 2.50	Waushara, Wisconsin.	S. Weidman.	S. Weidman, G. N. H. S. Wisc. Bull. 3, p. 2, 1898.	Granite.	In W. T., p. 127.
14	I.3(4).1''.''3.	Q 38.40 il 0.28 or 32.80 hm 0.56 ab 23.58 an 2.78 C 1.22	Nettie Mine, Butte, Montana.	W. F. Hille- brand.	W. H. Weed, J. G., VII, p. 739, 1899.	Aplite.	In W. T., p. 127.
15	I.3(4).1''.(2)3.	Q 38.94 hy 0.20 or 34.47 hm 0.67 ab 20.96 an 2.50 C 1.20	Nettie Mine, Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Aplite.	In W. T., p. 127.
16	I.3(4).1''3.	Q 39.00 wo 0.23 or 28.36 mt 0.46 ab 27.77 il 0.30 an 2.50 hm 0.96	Sheridan Volcano, Yellowstone National Park.	G. Steiger.	U. S. G. S. B. 419, p. 71, 1910.	Rhyolite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
17	75.52	14.11	1.74	0.08	0.10	0.78	3.92	3.63	0.39		none		none	FeS ₂ 0.11	100.38	
A2. II	1.255	.138	.011	.001	.003	.014	.063	.039			—		—			
18	74.70	13.72	1.01	0.62	0.14	0.78	3.90	4.02	0.62		none	none	trace	FeS ₂ 0.40	99.91	2.345
A2. II	1.245	.134	.006	.008	.004	.014	.063	.042			—	—	—			
19	77.03	12.00	0.76	0.86	0.04	0.80	3.21	4.92	0.30	0.14	0.13	trace	trace	F BaO Li ₂ O	0.36 trace trace	100.55
A1. I	1.284	.118	.010	.012	.001	.014	.051	.052			.002	—	—			
20	77.02	11.63	0.32	1.09	0.14	1.24	2.85	5.21	0.35				trace			99.85
A3. III	1.284	.114	.002	.015	.004	.022	.046	.055					—			
21	73.11	13.16	0.62	0.23	0.19	0.54	2.85	5.10	4.05				0.14			99.99
A3. III	1.219	.129	.004	.003	.005	.010	.046	.055					.002			
22	77.33	12.55	0.91	n. d.	0.10	0.17	3.19	4.80	0.53	0.15	0.09	trace	trace	CO ₂ BaO SrO Li ₂ O	none trace trace trace	99.82
A3. III	1.289	.123	.006	(.012)	.003	.003	.051	.051			.001	—	—			
23	75.84	13.38	1.45	n. d.	0.10	0.07	3.33	4.73	0.71	0.18	0.09	trace	trace	CO ₂ BaO SrO Li ₂ O	none trace trace trace	99.88
A3. III	1.264	.131	.009	(.018)	.003	.002	.053	.050			.001	—	—			
24	77.09	13.04	0.82	0.26	0.12	0.63	3.11	4.50	0.07	0.03	0.05	0.10	trace	BaO SrO	none none	99.82
A2. II	1.284	.128	.005	.004	.003	.011	.050	.048			—	.001				2.600
25	76.17	12.32	1.47	0.20	none	0.17	3.94	4.27	0.79	0.23	0.20	0.04	none	CO ₂ ZrO ₂ S NiO BaO	none 0.03 none none 0.10	99.93
A1. I	1.270	.121	.009	.003	—	.003	.064	.046			.003	—	—			
26	77.68	11.81	0.72	0.51	0.18	0.72	2.96	5.00	0.27	0.04	0.14	0.10	trace			100.13
A2. II	1.295	.116	.005	.007	.005	.013	.048	.053			.002	.001				
27	74.24	14.50	1.27	0.67	0.25	0.11	3.00	3.66	2.04		0.20	0.07	0.06	SO ₂ BaO SrO Li ₂ O	0.03 0.18 trace none	100.28
A1. I	1.237	.142	.008	.008	.006	.002	.043	.039			.003	—	.001			
28	77.26	11.54	0.85	0.13	0.20	0.58	2.96	4.65	0.96	1.03	0.18	trace	0.03	CO ₂ BaO SrO	none none none	100.37
A1. I	1.286	.113	.005	.002	.005	.010	.048	.050			.002	—	—			
29	75.17	15.83	n. d.	0.90	0.39	0.46	2.08	3.18	2.16					CO ₂ FeS ₂	0.61 0.17	100.95
A3. IV	1.253	.155	—	.013	.010	.008	.034	.034								
30	81.08	11.45	n. d.	0.21	trace	0.46	2.30	3.64	0.60							99.74
A3. III	1.351	.112	—	.003	—	.009	.037	.039								
31	76.54	14.09	1.47	n. d.	0.10	0.19	2.32	4.64	0.74							100.09
A3. III	1.276	.138	.009	(.018)	.003	.004	.037	.049								

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODI POTASSIC. ALASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
17	I.3(4).1(2).3(4).	Q 36.72 hy 0.30 or 21.68 mt 0.23 ab 33.01 hm 1.60 an 3.89 C 2.24	Obsidian Cliff, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. A. R. 7, p. 282, 1833.	Obsidian (red).	Also in U. S. G. S. Mon. 32, p. 426, 1899. In W. T., p. 127.
18	I.3(4).1(2).3(4).	Q 34.86 hy 0.66 or 23.35 mt 1.39 ab 33.01 an 3.89 C 1.53	Obsidian Cliff, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. A. R. 7; p. 282, 1833.	Obsidian (black).	Also in U. S. G. S. Mon. 32, p. 426, 1899. In W. T., p. 149.
19	I.3(4).1(2).3.	Q 37.68 hy 0.10 or 28.91 mt 2.32 ab 26.72 il 0.30 an 3.89	Sentinel Point, Pikes Peak, Colorado.	W. F. Hille- brand.	E. B. Mathews, U. S. G. S. B. 150, p. 177, 1898.	Biotite granite.	Also in J. G., VIII, p. 237, 1900. In W. T., p. 127.
20	I.3(4).1(2).3.	Q 37.62 di 2.42 or 30.58 hy 0.79 ab 24.10 mt 0.46 an 3.34	Platte Canyon, Jefferson County, Colorado.	H. N. Stokes.	E. B. Mathews, U. S. G. S. B. 148, p. 179, 1897.	Granite.	In W. T., p. 127.
21	I.3(4).1''3.	Q 35.22 hy 0.63 or 30.58 mt 0.93 ab 24.10 an 2.78 C 1.84	Rosita, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, (II), p. 324, 1896.	Pitchstone.	In W. T., p. 127.
22	I.3''1.3.	Q 39.42 hy 1.75 or 28.36 il 0.15 ab 26.72 an 0.83 C 1.84	Tordrillo Moun- tains, Alaska.	H. N. Stokes.	J. E. Spurr, Am. G., XXV, p. 231, 1900.	Alaskite.	In W. T., p. 127.
23	I.3(4).1.3.	Q 37.32 hy 2.54 or 27.80 il 0.10 ab 27.77 an 0.56 C 2.65	Tordrillo Moun- tains, Alaska.	H. N. Stokes.	J. E. Spurr, Am. G., XXV, p. 231, 1900.	Tordrillite.	In W. T., p. 127.
24	I.3''1''3.	Q 41.16 hy 0.30 or 26.69 mt 1.16 ab 26.20 ap 0.34 an 2.22 C 2.24	Sheppard Creek, Rossland District, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38, (1), p. 355, 1912.	Granite.	
25	I.3(4).1.3''.	Q 36.24 il 0.46 or 25.58 hm 1.47 ab 33.54 an 0.83 C 0.82	Easton, Snoqual- mie quadrangle, Washington.	G. Steiger.	Smith and Calkins, U. S. G. S. Fol. 139, p. 5, 1906.	Rhyolite.	
26	I.3''1''3.	Q 39.84 hy 0.50 or 29.47 mt 1.16 ab 25.15 il 0.30 an 2.78 ap 0.34 C 0.51	Pyramid Peak, Eldorado County, California.	G. Steiger.	W. Lindgren, A. J. S., III, p. 306, 1897.	Granite.	In W. T., p. 127.
27	I.3.1.3.⊙	Q 42.30 hy 0.60 or 21.68 mt 1.39 ab 25.15 il 0.46 an 0.56 hm 0.32 C 5.41	Willow Lake, Plumas County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 192, 1897.	Rhyolite.	In W. T., p. 127.
28	I.3''1''3.	Q 40.38 hy 0.50 or 27.80 il 0.31 ab 25.15 hm 0.85 an 2.78 C 0.51	Bush Peak, Bull- frog District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. B. 419, p. 43, 1910.	Rhyolite.	
29	I.3.1(2).3.	Q 48.36 hy 2.72 or 18.90 ab 17.82 an 2.22 C 8.06	Mizpah Shaft, Tonopah, Nevada.	G. J. Young.	J. A. Burgess, Ec. Geol., IV, p. 690, 1909.	Rhyolite.	
30	I.3.1(2).3.	Q 52.44 hy 0.40 or 21.68 ab 19.39 an 2.50 C 2.75	Berufjordskard, Iceland.	C. W. Schmidt.	C. W. Schmidt, Z. D. G. G., XXXVII, p. 776, 1885.	Liparite.	In W. T., p. 127.
31	I.3.1''3.	Q 43.86 hy 2.68 or 27.24 ab 19.39 an 1.11 C 4.90	Kinlochewe, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc., Edin., VIII, p. 54, 1901.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
32	76.01	13.47	1.54	n. d.	0.06	0.54	2.32	5.57	0.56			0.12			100.19	
A4. IV	1.287	.132	.009	(.018)	.002	.010	.037	.060				.001				
33	75.09	13.46	0.74	1.05	0.74	0.66	3.10	3.78	0.77	0.14	0.25	0.19	0.14	CO ₂ 0.02 S none NiO none BaO none Li ₂ O none	100.13	
A1. I	1.252	.132	.005	.015	.019	.012	.050	.040			.003	.001	.002			
34	74.54	14.86	2.53	0.23	trace	0.29	3.49	3.73	0.87				trace	Li ₂ O trace	100.54	2.66
A3. III	1.242	.146	.016	.003	—	.005	.056	.039					—			
35	77.10	13.10	0.64	0.69	1.03	0.37	3.05	4.58	0.50		0.07				101.13	
B3. III	1.285	.128	.004	.010	.026	.007	.049	.049			.001					
36	76.81	12.35	0.21	0.69	1.66	none	2.55	4.95	0.20						99.42	
A3. III	1.280	.121	.001	.010	.042	—	.040	.053								
37	74.81	13.62	0.52	0.69	1.03	0.44	3.19	4.28	1.00						99.58	
A3. III	1.247	.134	.003	.010	.026	.008	.052	.046								
38	76.10	13.45	1.34	n. d.	0.64	0.42	2.55	5.01	1.00						100.48	
A4. IV	1.268	.132	.008	(.016)	.016	.007	.041	.053								
39	76.85	12.20	1.75	n. d.	1.27	0.30	2.22	4.55	1.12						100.26	
A4. IV	1.281	.120	.011	(.022)	.032	.005	.035	.049								
40	74.10	15.61	0.85	n. d.	1.12	0.38	3.32	3.18	1.30						99.86	
A4. IV	1.235	.153	.005	(.010)	.028	.007	.053	.034								
41	75.30	13.82	n. d.	1.03	0.90	0.45	3.40	4.07	0.80						99.82	
A4. IV	1.255	.135	—	.015	.023	.008	.055	.043								
42	75.50	13.73	n. d.	0.66	0.77	0.32	3.41	4.10	0.90		0.13	0.07			99.59	
A3. III	1.258	.135	—	.009	.019	.006	.055	.043			.002	—				
43	75.6	13.2	1.3	n. d.	0.6	0.6	2.5	5.4	1.0						100.1	
B3. IV	1.280	.129	.008	(.016)	.015	.011	.040	.057								
44	77.77	11.64	1.56	n. d.	0.15	0.50	3.80	4.20	0.61						100.23	
A4. IV	1.296	.114	.010	(.020)	.004	.009	.061	.044								
45	81.80	7.65	1.88	0.70	0.64	none	2.97	2.75	1.01		0.13				99.53	
A3. III	1.363	.075	.012	.010	.016	—	.048	.030			.002					
46	81.20	9.40	1.35	n. d.	0.77	none	2.45	4.55	0.70						100.42	
A4. IV	1.353	.092	.008	(.016)	.019	—	.040	.049								
47	74.70	12.81	2.23	n. d.	0.56	trace	2.44	5.70	1.12		0.35				99.91	
A4. IV	1.245	.125	.014	(.028)	.014	—	.039	.061			.004					

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODIOTASSIC. ALASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
32	I.3''1''(2)3.	Q 39.06 hy 2.58 or 33.36 ap 0.34 ab 19.39 an 1.95 C 2.86	Cairngorm, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc., Edin., VIII, p. 54, 1901.	Granite.	
33	I.3.1''3.	Q 39.96 hy 3.09 or 22.24 mt 1.16 ab 26.20 il 0.46 an 2.50 ap 0.34 C 3.37	Hay Tor, Dartmoor, England.	E. G. Radley.	Flett and Dewey, G. S. Eng. Mem., sheet 338, p. 42, 1912.	Granite.	
34	I.3.1.3''.	Q 39.72 mt 0.70 or 21.68 hm 2.08 ab 29.34 an 1.39 C 4.69	Botallack, Cornwall.	Phillips.	J. J. H. Teall, Brit. Petr., p. 314, 1888.	Granite.	In W. T., p. 127.
35	I.3''1''3.	Q 39.12 hy 3.26 or 27.24 mt 0.93 ab 25.68 il 0.15 an 1.95 C 2.24	Le Clou, Brittany, France.	Pisani.	L. Vandernotte, Mass. Arm., p. 48, 1913.	Rhyolite.	
36	I.3''1.3.	Q 40.26 hy 5.39 or 29.47 mt 0.23 ab 20.96 C 2.24	La Pouliniere, Brittany, France.	Pisani.	L. Vandernotte, Mass. Arm., p. 48, 1913.	Microgranite.	
37	I.3(4).1''3.	Q 36.60 hy 3.52 or 25.58 mt 0.70 ab 27.25 an 2.22 C 2.83	Louvigné-Gorron, Brittany, France.	Pisani.	L. Vandernotte, Mass. Arm., p. 41, 1913.	Microgranite.	
38	I.3''1.3.	Q 39.48 hy 3.71 or 29.47 ab 21.48 an 1.95 C 3.16	Marcillat, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Porphyry.	
39	I.3.1''3.	Q 42.78 hy 6.10 or 27.24 ab 18.34 an 1.39 C 3.16	Poux, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1901.	Porphyry.	
40	I.3.1''3(4).	Q 39.66 hy 4.12 or 18.90 ab 27.77 an 1.95 C 6.22	Gouzou, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1901.	Microgran- ulite.	
41	I.3(4).1''3.	Q 36.78 hy 4.23 or 23.91 ab 28.82 an 2.22 C 2.96	Charbonnières, Lyonnais, France.	Pisani.	A. Michel-Levy, C. R., CLVI, p. 718, 1913.	Granite.	
42	I.3''1.3.	Q 37.92 hy 2.82 or 23.91 il 0.39 ab 28.82 an 1.67 C 3.16	Mont Salomon, Lyonnais, France.	Pisani.	A. Michel-Levy, C. R., CLVI, p. 718, 1913.	Granite.	
43	I.3(4).1(2).3.	Q 37.50 hy 3.61 or 31.99 ab 20.96 an 3.06 C 2.14	Genis, Corrèze, France.	J. de Lapparent.	J. de Lapparent, B. Soc. Min. Fr., XXXII, p. 267, 1909.	Microgranite.	
44	I.3(4).1''3''.	Q 37.44 hy 3.04 or 24.46 ab 31.96 an 2.50	Pelvoux, Dauphiny, France.	Rüst.	P. Termier, B. Soc. G. Fr., XXVII, p. 404, 1899.	Aplite.	Not in W. T.
45	I''3.1.3(4).	Q 53.10 ac 1.39 or 16.68 hy 1.60 ab 23.58 mt 1.86 il 0.30 hm 0.64	Esterel, France.	Pisani.	A. Michel-Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 40, 1912.	Pyromeride.	
46	I.3.1.3.○.	Q 46.32 ac 1.39 an 27.24 hy 4.01 ab 20.96	Colle Motte, Esterel, France.	Pisani.	A. Michel-Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 40, 1912.	Pyromeride.	
47	I.3(4).1.(2)3.	Q 36.42 hy 4.57 or 33.92 il 0.61 ab 20.44 C 2.45	Arditurri, La Haya, Guipuzcoa, Spain.	Pisani.	P. Termier, B. Soc. G. Fr., VII, p. 13, 1907.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
48	77.50	11.80	0.41	0.72	0.65	0.39	3.10	4.18	1.90		0.06				100.71	
A3. III	1.292	.116	.003	.010	.016	.007	.050	.044			—					
49	75.50	11.27	2.13	0.23	1.21	0.47	3.41	3.38	1.60						99.20	
B3. IV	1.258	.111	.013	.003	.030	.008	.055	.036								
50	77.20	12.11	1.61	n. d.	trace	0.14	3.87	4.07	0.36		0.10				99.46	
A4. IV	1.287	.119	.010	(.020)	—	.002	.062	.043			.001					
51	76.05	11.68	0.34	1.05	0.29	0.42	3.79	5.09	1.36		0.05		trace	ZrO ₂ 0.42 F trace Li ₂ O trace	100.54	2.636
A2. II	1.268	.114	.002	.015	.007	.008	.060	.054			—		—			
52	76.73	12.70	1.38	n. d.	0.12	0.50	3.17	4.55	0.57		0.24				99.96	
A3. III	1.279	.125	.009	(.018)	.003	.009	.051	.048			.003					
53	74.30	12.20	2.22	0.88	0.27	1.09	2.82	5.00	1.00		0.24	0.24	0.08		100.34	
A2. II	1.238	.120	.014	.013	.007	.020	.045	.053			.003	.002	.001			
54	76.94	12.89	1.72	n. d.	0.26	0.55	3.13	4.43	0.61				trace		100.53	
A4. IV	1.282	.127	.011	(.022)	.007	.010	.050	.046								
55	76.82	11.59	0.69	1.17	0.37	1.03	3.44	4.74	0.36		0.17	0.05	0.10		100.53	
A2. II	1.280	.114	.004	.017	.009	.018	.055	.050			.002	—	.001			
56	78.50	10.95	0.36	0.70	0.18	1.00	3.15	4.97	0.40		0.08	0.02	0.06		100.37	
A2. II	1.308	.108	.002	.010	.005	.018	.051	.053			.001	—	.001			
57	76.26	12.06	1.14	0.66	0.06	0.69	2.89	4.50	0.71		0.40		0.25		99.62	
A2. II	1.271	.118	.007	.009	.002	.012	.047	.048			.005		.004			
58	72.93	13.87	1.94	0.79	0.51	0.74	3.68	3.74	1.18		0.50		0.14		100.02	
A2. II	1.216	.136	.012	.011	.013	.013	.060	.039			.006		.002			
59	75.44	10.99	2.33	0.93	0.25	1.24	2.72	4.98	1.06				0.47		100.41	
A3. III	1.257	.108	.014	.013	.006	.022	.043	.054					.007			
60	77.71	10.13	1.41	2.15	1.13	0.21	1.85	4.50	0.46		0.48		trace		100.03	
A3. III	1.295	.099	.009	.030	.028	.004	.030	.048			.006					
61	75.26	12.71	0.97	1.11	0.29	0.66	2.65	5.56	0.89		0.25	0.04	0.02		100.41	
A2. II	1.254	.125	.006	.015	.007	.012	.043	.060			.003	—	—			
62	77.68	12.95	0.96	0.37	0.21	0.30	3.18	4.37	0.71			trace			100.73	2.615
A3. III	1.295	.127	.006	.005	.005	.005	.051	.047				—				
63	76.56	12.75	0.21	0.61	0.14	0.46	3.38	4.85	0.68						99.64	
A3. III	1.276	.125	.001	.008	.004	.008	.055	.052								

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. ALASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
48	I.3.1.3.⊙.	Q 41.46 hy 2.52 or 24.46 mt 0.70 ab 26.20 an 1.98 C 1.53	Restonica, Corsica.	Pisani.	Termier and Deprat, C. R., CXLVII, p. 207, 1908.	Granite.	
49	I.3.1''.3(4).	Q 39.96 hy 3.00 or 20.02 mt 0.70 ab 28.82 hm 1.60 an 2.22 C 1.21	Fornia, n. Bastia, Corsica.	J. Deprat.	J. Deprat. B. Sv. Ct. G. Fr., XVII, No. 117, p. 59, 1907.	Microgranite.	
50	I.3(4).1.3''..	Q 38.04 hy 2.51 or 23.91 il 0.15 ab 32.49 an 0.56 C 1.22	Kroftkollen, Drammen, Norway.	Mauzelius.	W. C. Brögger, Z. K., XVI, p. 77, 1890.	Quartz por- phyry.	In W. T., p. 129.
51	I.3(4).1.3.	Q 33.36 di 1.89 or 30.02 hy 1.46 ab 31.44 mt 0.46	Drammen, Norway.	P. Jannaseh.	H. O. Lang, Nyt. Mag., XXX, p. 40, 1886.	Quartz por- phyry.	Also, Brögger, Z. K., XVI, p. 77, 1890. In W. T., p. 151.
52	I.3(4).1''.3.	Q 38.94 hy 2.28 or 28.69 il 0.46 ab 26.72 an 2.50 C 0.71	Hennum, Norway.	Mauzelius.	W. C. Brögger, Z. K., XVI, p. 77, 1890.	Aplitic grano- phyre.	In W. T., p. 129.
53	I.3(4).1(2).3.	Q 37.02 hy 0.70 or 29.47 mt 2.55 ab 23.58 il 0.46 an 3.61 hm 0.48 C 0.92 ap 0.67	Gellivara, Lapland, Sweden.	Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	
54	I.3''.1(2).3.	Q 39.42 hy 3.60 or 25.58 ab 26.20 an 2.78 C 2.14	Hällebacken, Nora, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
55	I.3(4).1''.3.	Q 36.12 di 2.10 or 27.80 hy 1.42 ab 28.82 mt 0.93 an 2.50 il 0.30	Ankarsrum, Smaland, Sweden.	Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
56	I.3''.1.3.	Q 39.00 di 3.07 or 29.47 mt 0.46 ab 26.72 il 0.15 an 1.11	Hummelstad, Smaland, Sweden.	Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
57	I.3.1(2).3.	Q 40.50 hy 0.20 or 26.69 mt 1.62 ab 24.63 il 0.76 an 3.34 C 0.10	Sundsvall, Rödö, Sweden.	Santesson.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 45, 1899.	Granite porphyry.	In W. T., p. 129.
58	I.3(4).1(2).3(4).	Q 34.98 hy 1.30 or 21.68 mt 1.62 ab 31.44 il 0.91 an 3.61 hm 0.90 C 2.45	Rödö, Sweden.	Santesson.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 14, 1899.	Rapakivi granite.	In W. T., p. 129.
59	I.3(4).1(2).3.	Q 37.68 di 2.57 or 30.02 hy 0.36 ab 22.53 mt 3.02 an 3.06	Kastagropen, n. Karlshamn, Scania, Sweden.	Santesson.	H. Bäckström, K. Sv. Vet. Ak. Hand., XXIX, p. 18, 1897.	Granulite (crushed granite).	In W. T., p. 129.
60	I''.3.1(2).3.	Q 46.56 hy 4.78 or 26.69 mt 2.09 ab 15.72 il 0.91 an 1.11 C 1.73	Pytterlaks, Finland.	Struve.	V. Hackmann, B. C. G. Finl., No. 15, p. 17, 1905.	Rapakivi granite.	
61	I.(2)3.1(2).3.	Q 35.94 hy 1.49 or 33.36 mt 1.39 ab 22.53 il 0.46 an 3.34 C 1.02	Pitkäranta, Finland.	I. G. Sundell.	V. Hackmann, B. C. G. Finl., No. 15, p. 25, 1905.	Rapakivi granite.	Alkalies inter- changed.
62	I.3''.1.3.	Q 41.52 hy 0.50 or 26.13 mt 1.16 ab 20.72 hm 0.16 an 1.39 C 2.45	Tryberg, Schwartz- wald, Baden.	L. McCay.	G. H. Williams, N. J. B. B. II, p. 609, 1883.	Quartz porphyry.	In W. T., p. 129.
63	I.3(4).1''.3.	Q 36.42 hy 1.32 or 28.93 mt 0.23 ab 28.82 an 2.22 C 1.02	Grossachsener, Thal, Baden.	P. Phookan.	K. Futterer, Mt. Bad. G. L.-A., II, p. 41, (1890), 1893.	Granite.	In W. T., p. 129.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
64	74.82	13.63	0.97	0.83	0.08	0.87	3.03	4.81	0.82						99.86	
A3. III	1.247	.134	.006	.011	.002	.006	.048	.051								
65	76.75	12.42	0.43	0.87	trace	0.45	2.52	5.81	0.39			trace		SO ₃ 0.12	99.76	2.615
A3. III	1.279	.122	.003	.013	—	.008	.040	.062				—				
66	74.71	13.05	1.55	0.72	0.16	0.49	2.47	5.52	0.87			0.09		CO ₂ 0.32 SO ₃ 0.19	100.30	2.610
A2. II	1.245	.128	.010	.010	.004	.009	.040	.059				—				
67	79.90	12.16	0.88	0.22	0.28	0.26	2.45	2.51	1.01		0.26	0.16	0.20	CO ₂ 0.11	100.40	
A2. II	1.332	.119	.006	.003	.007	.005	.040	.026			.003	.001	.003			
68	77.48	11.61	0.57	1.63	0.27	0.43	2.48	3.73	1.56			0.23		F Li ₂ O trace	100.22	2.663
A3. III	1.291	.114	.004	.022	.007	.008	.040	.039				.002				
69	74.25	13.68	0.31	1.38	0.32	0.85	2.94	4.65	0.65		trace	0.18			99.21	
B2. III	1.238	.134	.002	.019	.008	.015	.047	.050			—	.001				
70	74.63	10.54	3.59	0.45	1.23	0.84	2.22	5.33	0.63		0.43				99.89	
A2. II	1.244	.103	.023	.007	.031	.015	.035	.056			.005					
71	74.24	15.00	1.14	n. d.	trace	0.68	3.11	3.93	1.74						99.84	
A4. IV	1.237	.147	.007	(.014)	—	.012	.050	.041								
72	73.70	13.60	0.56	1.76	0.36	0.96	2.64	4.31	1.22			0.30		BaO trace Li ₂ O trace Cu trace	99.41	2.672
A3. III	1.228	.133	.004	.024	.009	.017	.043	.046				.002				
73	76.47	11.61	0.21	0.72	trace	1.26	3.29	4.48	1.21		0.18	trace			99.43	
B2. III	1.265	.114	.001	.010	—	.022	.053	.048			.002	—				
74	77.26	11.66	1.18	1.42	0.40	0.46	3.10	4.64	0.42			0.31		S 0.02	100.87	
A2. II	1.288	.114	.008	.019	.010	.008	.050	.049				.002				
75	73.84	13.60	1.47	1.47	0.43	1.00	2.16	5.25	0.90			0.22		S 0.04	100.38	
A2. II	1.231	.133	.009	.021	.011	.018	.035	.056				.002				
76	75.62	14.01	0.56	0.26	0.39	0.53	2.88	5.59	0.57	0.08	trace	0.09	0.02		100.60	2.62
A2. II	1.260	.137	.004	.004	.010	.009	.047	.060			—	—	—			
77	75.45	10.39	2.16	1.12	0.34	1.58	3.42	4.53	0.47	0.08	0.13	0.06	0.04		99.77	2.65
A2. II	1.258	.102	.014	.015	.009	.029	.055	.048			.002	—	—			
78	74.30	13.77	1.76	0.30	0.85	0.30	2.71	4.96	1.25	0.02		0.20	0.02		100.44	2.67
A2. II	1.238	.135	.011	.004	.021	.005	.044	.053				.001	—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBBRANG 3. SODI-POTASSIC. ALASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
64	I.3''.1.3.	Q 38.04 hy 0.86 or 28.36 mt 1.39 ab 25.15 an 1.67 C 2.96	Staudenbuhl, n. Heiligkreuz, Baden.	Beckmann.	K. Futterer, Mt. Bad. G. L.-A., II, p. 41, 1893.	Granite.	In W. T., p. 129.
65	I.3(4).1''.(2).3.	Q 38.44 hy 1.32 or 34.47 mt 0.70 ab 20.96 an 2.22 C 1.22	Heißeisenhäu, Brocken, Harz.	Kluss.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXIX, (II), p. 204, 1908.	Aplitic granite.	
66	I.3(4).1''.3.	Q 37.74 hy 0.40 or 32.80 mt 2.32 ab 20.96 an 2.50 C 2.04	Frankenthal, Brocken, Harz.	Eyme.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXVII, p. 344, 1906.	Granite.	
67	I.(2)3.1.3(4).	Q 55.50 hy 0.70 or 14.46 mt 0.70 ab 20.96 il 0.46 an 0.56 hm 0.48 C 5.20 ap 0.34	Königsberg, Wolfstein, Blatt Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kte. Bay., XX, p. 34, 1910.	Quartz porphyry.	
68	I.3.1''.3.	Q 47.40 hy 3.08 or 21.68 mt 0.93 ab 20.96 ap 0.67 an 0.28 C 2.75	Epprechtstein, Fichtelgebirge, Bavaria.	A. Böttger.	F. v. Sandberger, Sb. Münch. Ak., XVIII, p. 466, 1888.	Lithionite granite.	Also, Böttger, In. Diss., München, p. 14, 1889. In W. T., p. 129.
69	I.3(4).1(2).3.	Q 36.42 hy 3.04 or 27.80 mt 0.46 ab 24.63 ap 0.34 an 3.34 C 2.55	Schneeberg, n. Wunsiedel, Fichtelgebirge, Bavaria.	H. Oberembt.	H. Oberembt, In. Diss. Erl., p. 19, 1905.	Granite.	
70	I''.3''.1(2).(2).3.	Q 38.40 di 0.65 or 31.14 hy 2.80 ab 18.34 mt 0.46 an 3.34 il 0.76 hm 3.36	Near Pfreimt, Bayrischer Wald, Bavaria.	Not stated.	K. W. v. Gümbel, G. v. Bayern, II, p. 436, 1894.	Granite.	Not in W. T.
71	I.3''.1(2).3.	Q 39.12 hy 1.85 or 22.80 ab 26.20 an 3.34 C 4.49	Hochbuchet, Passau, Bayrischer Wald, Bavaria.	Techn. Anal.	A. Frentzel, Geogn. Jhft., XXIV, p. 176, 1911.	Aplite.	
72	I.3''.1(2).3.	Q 38.70 hy 3.54 or 25.58 mt 0.93 ab 22.53 ap 0.67 an 2.78 C 3.47	Platten, Bohemia.	Not stated.	Böttger, Mt. Phar. Inst. Erl., 1889.	Granite.	Osann, II, p. 10.
73	I.3(4).1(2).3.	Q 36.84 di 2.23 or 26.09 hy 0.13 ab 27.77 mt 0.23 an 3.61 il 0.30	Nemetbogsan, Krasso-Szőreny, Dognacska, Hungary.	K. Emszt.	Rozloznsnik and Emszt, Mt. Ung. G.-A., XVI, p. 191, 1908.	Aplite.	
74	I.3''.1.3.	Q 40.26 hy 2.55 or 27.24 mt 1.86 ab 26.20 ap 0.67 an 0.28 C 1.43	Plawen, Vintschgau, Tyrol.	C. von John.	Hammer and von John, Jb. G. R.-A., Wien, LIX, p. 707, 1910.	Granite porphyry.	
75	I.3''.1(2).(2).3.	Q 38.40 hy 2.68 or 31.14 mt 2.09 ab 18.44 ap 0.67 an 3.06 C 3.16	Piz Sesvenna, Vintschgau, Tyrol.	C. von John.	Hammer and v. John, Jb. G. R.-A., Wien, LIX, p. 707, 1910.	Granite porphyry.	
76	I.3(4).1''.3.	Q 35.40 hy 1.00 or 33.36 mt 0.93 ab 24.63 an 2.50 C 2.14	Skopi, Gottard Massif, Bernese Alps, Switzer- land.	L. Hezner.	U. Grubenmann, pers. com., 1913.	Aplite.	
77	I''.3(4).1.3.	Q 36.24 ac 0.46 or 26.09 di 1.94 ab 28.30 wt 2.32 mt 3.02 il 0.30	Pontresina, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com., 1913.	Paisanite porphyry.	
78	I.3''.1.3.	Q 37.86 hy 2.10 or 29.47 mt 0.93 ab 23.06 hm 1.12 an 0.56 ap 0.34 C 3.67	Muraunbach, Gotthard Massif, Bernese Alps, Switzerland.	L. Hezner.	U. Grubenmann, pers. com., 1913.	Quartz por- phyry.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC—ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
79	77.26	11.52	n. d.	1.47	trace	1.06	3.69	4.35	0.46		trace	trace	trace		99.81	2.60
A4. IV	1.288	.113	—	.021	—	.019	.060	.047								
80	76.62	12.65	0.09	0.88	0.19	0.32	3.13	4.55	1.65						100.08	
A3. III	1.277	.124	.001	.013	.005	.006	.050	.049								
81	75.25	10.39	1.57	2.43	0.08	0.25	4.39	4.35	0.61		0.50				99.82	
A3. III	1.254	.102	.010	.033	.002	.005	.071	.047			.006					
82	74.73	10.39	4.47	0.70	0.21	0.18	4.12	4.88	1.13						100.31	
A3. III	1.246	.102	.028	.010	.005	.003	.066	.047								
83	74.75	14.70	0.97	n. d.	1.07	none	3.42	4.31	0.75						99.97	
A4. IV	1.246	.144	.006	(.012)	.027	—	.055	.046								
84	74.51	15.70	0.77	n. d.	0.99	none	3.25	4.45	0.60						100.27	
A4. IV	1.242	.154	.005	(.010)	.025	—	.052	.048								
85	78.49	9.99	1.94	1.18	0.09	0.30	3.74	3.84	0.72				trace	Li ₂ O trace	100.29	
A3. III	1.308	.098	.012	.017	.002	.005	.060	.040								
86	77.39	13.16	0.81	n. d.	trace	0.75	3.60	4.32				trace			100.73	
A4. IV	1.290	.129	.005	(.010)	—	.013	.058	.045				—				
87	75.70	11.65	2.27	0.33	0.07	0.40	2.79	4.36	1.26	0.27	0.57	0.13			99.80	
A2. II	1.262	.114	.014	.005	.002	.007	.045	.047			.007	.001				
88	75.68	14.74	0.57	0.95	trace	0.15	3.13	4.58	1.00				0.13		100.93	
A3. III	1.261	.145	.004	.013	—	.003	.050	.049					.002			
89	76.19	11.53	0.84	1.25	0.60	1.14	3.80	4.14	0.28	none	0.09	0.25	0.16		100.27	
A2. II	1.270	.113	.005	.017	.015	.020	.061	.044			.001	.002	.002			
90	78.14	11.89	0.60	0.27	0.15	0.44	3.51	4.62	0.28	0.32	0.06	0.02	0.02	ZrO ₂ 0.03 SO ₃ 0.05 S none BaO trace SrO trace	100.40	
A1. I	1.302	.117	.004	.004	.004	.008	.056	.049			.001	—	—			
91	77.28	11.90	1.30	0.18	0.10	0.80	3.01	5.26	0.38	0.07	0.12	0.04	trace	CO ₂ none ZrO ₂ none SO ₃ none Cl trace F none Cr ₂ O ₃ none NiO none BaO none	100.44	2.622
A1. I	1.288	.117	.008	.003	.003	.014	.048	.056			.002	—	—			
92	73.54	10.95	1.08	4.39	0.08	1.68	2.79	4.80	0.21	0.08	0.60				100.20	
A2. II	1.226	.108	.007	.061	.002	.030	.045	.051			.008					
93	78.47	10.68	0.18	2.23	trace	0.66	3.29	4.15	0.20	0.09	0.59	trace			100.54	
A2. II	1.308	.105	.001	.031	—	.012	.053	.044			.007	—				
94	76.10	15.95	trace	n. d.	0.11	0.23	2.90	3.27	1.16						99.72	2.673
A3. III	1.268	.156	—	—	.003	.004	.047	.035								

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. ALASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
79	I.3(4).1.3.	Q 36.00 di 3.23 or 26.13 hy 1.06 ab 31.44 an 1.67	Valle del Baganza, n. Parma, Italy.	M. Ferrari.	M. Ferrari, Mem. Ac. Linc. (5), VIII, No. 21, p. 730, 1911.	Granite pegmatite.	
80	I.3''.1.3.	Q 39.24 hy 2.08 or 27.24 mt 0.23 ab 26.20 an 1.67 C 1.94	Monte Alto, Euganean Hills, Italy.	G. Zender.	M. Stark, T. M. P. M., XXV, p. 321, 1906.	Rhyolite.	
81	I(II).3(4).1.3.	Q 33.72 ac 4.62 or 26.13 di 0.65 ab 28.82 di 1.24 hy 3.10 il 0.91	Mercureddu, San Antonio, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. Wiss., Anh. No. 2, p. 15, 1912.	Comendite.	Also in N. J. Ch., p. 738, 1912.
82	I(II).3(4).1.3.	Q 34.92 ac 5.08 or 26.13 di 0.65 ab 28.82 hy 0.20 mt 2.32 hm 1.12	Mercureddu, San Antonio, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. W., Anh. 2, p. 22, 1912.	Comendite.	Also in N. J. Ch., p. 738, 1912.
83	I.3(4).1.3.	Q 36.06 hy 4.28 or 25.58 ab 28.82 C 4.39	Filfila, n. Philippeville, Algeria.	P. Termier.	P. Termier, C. R., CXXXIV, p. 373, 1902.	Granite (fine).	
84	I.3(4).1.3.	Q 36.42 hy 3.82 or 26.69 ab 27.25 C 5.51	Filfila, n. Philippeville, Algeria.	P. Termier.	P. Termier, C. R., CXXXIV, p. 373, 1902.	Granite (coarse).	
85	I.3.1.3''.	Q 41.88 ac 0.92 or 22.24 di 1.21 ab 30.39 hy 0.50 mt 2.32	Dahamis, Socotra Island, Red Sea.	E. Ludwig.	A. Pelikan, Ds. Ak. Wiss., Wien, LXXI, p. 67, 1902.	Riebeckite granite.	
86	I.3(4).1(2).3''.	Q 38.16 hy 1.32 or 25.02 ab 30.39 an 3.61 C 1.33	Saganeiti, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 93, 1909.	Aplite.	
87	I.3.1.3.⊙	Q 42.00 hy 0.20 or 26.13 il 0.76 ab 23.58 hm 2.27 an 1.11 ru 0.16 C 1.84 ap 0.84	Tsivory, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Microgranite.	
88	I.3''.1.3.	Q 39.12 hy 0.90 or 27.24 mt 0.93 ab 26.20 an 0.83	Near Mok-pho, Chosen (Korea).	S. Shimidzu.	B. Koto, J. Coll. Sci. Tok., XXVI, p. 189, 1909.	Masano- phyre (rhyolite).	
89	I.3(4).1''.3''.	Q 35.46 di 1.14 or 24.46 hy 2.65 ab 31.96 mt 1.16 an 2.22 il 0.15 ap 0.67	Stanthorpe, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1912.	Granite.	H. C. Richards, pers. com.
90	I.3(4).1''.3.	Q 39.12 hy 0.40 or 27.24 mt 0.70 ab 29.34 il 0.15 an 2.22 hm 0.16 C 0.41	Butcharts Reef, Tingha, New South Wales.	Not stated.	A. R. Dep. Min. N. S. W. (1907), p. 185, 1908.	Granite.	
91	I.3(4).1(2).3.	Q 38.10 hy 0.30 or 31.14 mt 0.23 ab 25.15 il 0.30 an 3.61 hm 1.12	Cove River, Bowenfels, New South Wales.	Not stated.	A. R. Dep. Min. N. S. W. (1909), p. 198, 1910.	Aplitic granite.	
92	I(II).3(4).1(2).3.	Q 33.30 di 4.47 or 28.86 hy 3.90 ab 23.58 mt 1.62 an 3.34 il 1.22	Merulam, New South Wales.	L. A. Cotton.	W. G. Woolnough, Pr. Linn. Soc. N. S. W., XXXVI, p. 799, 1909.	Dacite.	
93	I.3''.1''.3.	Q 40.98 di 0.99 or 24.46 hy 2.51 ab 27.77 mt 0.23 an 2.22 il 1.06	Lake Karng, Mount Wellington, North Gippsland, Victoria.	Ampt.	E. O. Thiele, Pr. R. Soc. Vict., XXI, p. 266, 1908.	Quartz porphyry.	
94	I.3.1.3''.	Q 46.38 hy 0.30 or 19.46 ab 24.63 an 1.11 C 7.14	Omeo, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XXIV, p. 110, 1888.	Muscovite granite.	In W. T., p. 129.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
95	75.58	13.66	0.85	0.26	0.16	0.28	3.64	4.44	0.26	0.10	0.20	0.08	0.22	CO ₂ 0.04 Cl 0.02 FeS ₂ 0.16	99.95	
A1. I	1.260	.134	.005	.004	.004	.005	.059	.047			0.03	—	.003			
96	74.02	14.83	0.95	0.40	0.16	0.70	3.16	4.68	0.12	0.08	0.19	0.05	0.11	CO ₂ 0.02 Cl 0.02 FeS ₂ 0.07	99.56	
A1. I	1.234	.146	.006	.006	.004	.013	.051	.059			.002	—	.002			
97	78.35	11.56	0.61	0.90	0.61	0.02	2.86	3.97	0.12	0.24	0.18		0.03	CO ₂ 0.19 FeS ₂ 0.11	99.75	2.64
A2. II	1.306	.113	.004	.013	.015	—	.046	.042			.002		—			
98	75.83	14.11	0.49	0.12	0.25	0.55	3.12	5.32	0.41	0.13	0.08	0.20	trace	CO ₂ none S trace	100.61	
A2. II	1.264	.138	.003	.002	.006	.010	.050	.056			.001	.001	—			
99	77.59	12.75	0.67	none	0.16	0.04	2.56	3.99	1.54		0.63	trace	trace	SO ₃ 0.07 BaO 0.10	100.10	2.511
A2. II	1.293	.125	.004	—	.004	—	.041	.042			.008	—	—			
100	76.89	12.72	0.43	0.70	0.17	0.57	3.48	4.39	0.47	0.02	0.08	none	0.07	CO ₂ none Cl trace NiO none Li ₂ O trace	99.99	2.343
A2. II	1.282	.125	.003	.010	.004	.010	.056	.047			.001	—	.001			
101	74.73	10.82	2.46	0.58	0.20	0.80	2.68	4.40	2.94	0.27	0.12	0.12	0.03	CO ₂ none	100.15	
A2. II	1.246	.106	.016	.008	.005	.014	.044	.047			.002	.001	—			

RANG 1. PERALKALIC. ALASKASE.

1	66.91	19.01	3.70	1.79	0.59	0.35	4.62	1.44	0.64	0.20	0.27			CO ₂ 0.26	99.78	
A2. II	1.115	.186	.023	.025	.015	.006	.074	.015			.003					
2	74.52	10.07	3.74	2.81	0.01	0.86	3.88	3.46	0.86	0.07			0.20		100.48	
A3. III	1.242	.099	.023	.039	—	.015	.063	.037					.003			
3	79.03	13.23	0.34	0.18	0.07	0.25	3.95	2.28	0.18	0.01					99.52	
A3. III	1.317	.129	.002	.003	.002	.005	.064	.024								
4	73.84	16.44	0.50	0.68	trace	0.65	4.23	3.07	0.44						99.85	
A3. III	1.231	.161	.003	.009	—	.012	.068	.033								
5	75.19	13.77	0.61	1.37	0.09	0.68	3.83	3.33	0.65		none	none	trace	SO ₃ 0.29 Li ₂ O 0.02	99.83	
A2. II	1.253	.135	.004	.019	.002	.012	.061	.035			—	—	—			
6	74.51	14.83	1.09	trace	0.47	0.81	4.38	2.72	0.92		none	trace	none	SO ₃ 0.24 Li ₂ O 0.02	99.99	
A2. II	1.242	.145	.007	—	.012	.014	.071	.029			—	—	—			
7	76.00	14.88	0.65	0.10	0.06	0.19	3.52	2.77	1.42	0.20	0.04	0.11	trace	CO ₂ none SO ₃ trace Cl trace F trace BaO trace	99.94	
A1. I	1.266	.146	.004	.001	.002	.003	.056	.030			—	.001	—			
8	74.29	14.93	0.77	0.79	none	0.41	4.67	2.38	0.56				0.89		99.69	
A3. III	1.238	.146	.005	.011	—	.007	.076	.025					.013			
9	77.84	13.20	0.80	0.25	0.11	0.20	4.06	1.55	1.21	0.37	none	0.04	none	CO ₂ none Cl trace S 0.10 BaO none SrO none	99.73	
A1. I	1.297	.129	.005	.004	.003	.004	.066	.017			—	—	—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODIOPOTASSIC. ALASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
95	I.3(4).1.3.	Q 36.60 hy 0.40 or 26.13 mt 0.93 ab 30.92 il 0.46 an 1.39 hm 0.16 C 2.35	Cocata, South Australia.	W. S. Chapman.	R. L. Jack, G. S. S. Aust. B. 1, p. 12, 1912.	Granite.	
96	I.3(4).1(2).3.	Q 35.88 hy 0.40 or 27.80 mt 1.39 ab 26.72 il 0.30 an 3.61 C 3.26	Kolbolla, South Australia.	W. S. Chapman.	R. L. Jack, G. S. S. Aust. B. 1, p. 12, 1912.	Granite.	
97	I.3.1.3.⊙	Q 45.36 hy 2.42 or 23.35 mt 0.93 ab 24.10 il 0.30 C 2.55	Norseman, West Australia.	E. S. Simpson.	W. D. Campbell, W. Aust. G. S., B. 21, p. 119, 1906.	Granite.	
98	I.3(4).1.3.	Q 36.48 hy 0.60 or 31.14 mt 0.23 ab 26.20 il 0.15 an 1.95 hm 0.32 C 2.55 ap 0.34	Southern Cross, Yilgarn Goldfield, West Australia.	Surv. lab.	R. A. Farquharson, W. Aust. G. S., B. 49, p. 57, 1913.	Granite.	
99	I.3.1.3.⊙	Q 47.46 hy 0.40 or 23.35 hm 0.67 ab 21.48 ru 0.63 C 4.28	Omahu, Hauraki, New Zealand.	P. Holland.	P. Holland, Q. J. G. S., LV, p. 467, 1899.	Rhyolite.	In W. T., p. 129.
100	I.3(4).1''.3.	Q 37.98 hy 1.32 or 26.13 mt 0.70 ab 29.34 il 0.15 an 2.78 C 1.22	Tairua River, New Zealand.	E. J. Dunn.	A. R. Secy. Min. Vict. (1911), p. 62, 1912.	Obsidian "marekan- ite."	
101	I.3''.1(2).3.	Q 40.38 hy 0.50 or 26.13 mt 1.39 ab 23.06 il 0.30 an 3.06 hm 1.60 C 1.43	Waiau Valley, Aroha, Hauraki, New Zealand.	Surv. lab.	Henderson and Bartrum, N. Z. G. S. B. 16, p. 69, 1913.	Rhyolite perlite.	

SUBRANG 4. DOSODIC. TORDRILLOSE. (H. S. WASHINGTON, 1917.)

1	I''.3.1.4''.	Q 33.24 hy 1.50 or 8.34 mt 5.10 ab 38.77 il 0.46 an 1.67 hm 0.16 C 9.28	Lake Dufresnoy, Kewagama Lake, Quebec.	S. J. Lloyd.	M. E. Wilson, Can. G. S. Mem. 39 p. 47, 1913.	Dacite.	
2	I(II).3''.1.(3)4.	Q 36.90 ac 0.46 or 20.37 di 3.72 ab 32.49 hy 0.40 mt 5.57	East Greenwich, Rhode Island.	J. H. Perry.	Emerson and Perry, U. S. G. S. B. 311, p. 66, 1907.	Graphic micro- granite.	
3	I.3.1.4.⊙	Q 46.56 hy 0.33 or 13.34 mt 0.46 ab 33.54 an 1.39 C 3.67	Marcellon, Fox River Valley, Wisconsin.	W. W. Daniells.	Hobbs and Leith, B. Un. Wisc. 158, p. 262, 1907.	Aporhyolite.	
4	I.3(4).1(2).''4.	Q 35.70 hy 0.79 or 18.35 mt 0.70 ab 35.03 an 3.34 C 4.90	Marquette, Fox River Valley, Wisconsin.	W. W. Daniells.	Hobbs and Leith, B. Un. Wisc. 158, p. 262, 1907.	Aporhyolite.	
5	I.3''.1(2).(3)4.	Q 38.16 hy 2.18 or 19.46 mt 0.93 ab 31.96 an 3.34 C 2.75	Madison Plateau, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 426, 1899.	Rhyolite.	In W. T., p. 131.
6	I.3(4).1(2).4.	Q 36.12 hy 1.20 or 16.12 hm 1.09 ab 37.20 an 3.89 C 3.16	Echo Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 65, 1899.	Dacite porphyry.	In W. T., p. 131.
7	I.3.1.(3)4.	Q 44.88 hy 0.20 or 16.68 mt 0.23 ab 29.34 hm 0.48 C 6.12 ap 0.34	Grizzly Hill, Plumas County, California.	H. N. Stokes.	H. W. Turner, U. S. G. S. A. R. 17, (I), p. 721, 1896.	Granite.	In W. T., p. 131.
8	I.3(4).1''.4.	Q 35.94 hy 2.51 or 13.90 mt 1.16 ab 39.82 an 1.95 C 3.88	Catherine Mine, Pala, San Diego County, California.	W. T. Schaller.	U. S. G. S. rec. lab.	Pegmatite.	
9	I.3.1.4.⊙	Q 47.46 mt 1.05 or 9.45 ab 34.58 an 1.11 C 4.28	Tybo, Hot Creek Range, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. B. 228, p. 207, 1904.	Tordrillite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
10	80.79	11.13	0.35	n. d.	none	0.21	4.22	1.85	1.26						99.81	2.64
A3. III	1.347	.109	.002	(.004)	—	.004	.068	.020								
11	77.18	13.78	1.07	n. d.	0.05	0.12	3.68	3.27	0.63		trace	0.17		Cl 0.06	100.01	
A4. IV	1.286	.135	.007	(.014)	.001	.002	.060	.035			—	.001				
12	74.39	15.55	1.35	n. d.	0.33	0.48	3.79	2.14	1.18				0.22		99.43	2.72
A4. IV	1.240	.152	.009	(.018)	.008	.009	.061	.022					.003			
13	74.35	14.70	0.79	0.62	0.81	0.70	5.29	1.67	0.72	0.11	0.18	0.12	0.07	NiO trace? BaO 0.02 Li ₂ O trace	100.15	
A2. II	1.239	.144	.005	.008	.020	.013	.085	.018			.002	.001	.001			
14	78.8	10.9	1.5	n. d.	0.8	0.5	4.1	3.4	0.6						100.6	
B3. IV	1.313	.107	.009	(.018)	.020	.009	.006	.036								
15	73.80	14.60	n. d.	2.35	1.17	0.06	4.15	2.85	1.50		0.25				100.73	
A4. IV	1.230	.143	—	.033	.029	.001	.067	.031			.003					
16	72.20	10.75	0.89	0.80	0.65	0.45	3.95	3.17	7.32		0.06				100.24	
A3. III	1.203	.105	.006	.011	.016	.008	.064	.034			.001					
17	79.80	10.57	0.93	trace	0.99	0.24	4.40	1.91	0.70						99.54	
A3. III	1.330	.104	.006	—	.025	.004	.071	.020								
18	79.71	11.78	0.77	trace	0.30	0.12	5.31	2.00	0.29						100.28	
A3. III	1.329	.116	.005	—	.008	.002	.085	.021								
19	75.13	14.04	1.24	0.29	0.35	0.60	4.06	3.03	0.70	0.11	0.25			CO ₂ 0.22	100.02	
A2. II	1.252	.138	.008	.004	.009	.011	.066	.032			.003					
20	76.76	12.34	1.55	0.37	0.77	0.07	4.36	2.15	0.99	0.12	0.14				99.62	2.665
A3. III	1.279	.121	.010	.005	.019	.001	.070	.023			.002					
21	76.72	12.25	1.54	0.57	0.24	0.16	4.45	2.90	0.95	0.09	trace				99.87	2.690
B3. III	1.279	.120	.010	.008	.006	.003	.072	.031			—					
22	77.61	12.47	n. d.	0.97	0.11	0.22	4.10	3.58	0.72		trace	trace	trace		99.78	2.59
A3. III	1.294	.122	—	.014	.003	.004	.066	.038			—	—	—			
23	79.86	11.53	1.91	n. d.	0.04	0.44	2.66	2.24	0.80				0.50		99.98	2.55
A4. IV	1.331	.113	.012	(.024)	.001	.008	.043	.024					.007			
24	80.76	10.61	0.75	0.15	0.21	0.28	4.62	1.89	0.96		trace				100.23	2.38
A3. III	1.346	.104	.005	.002	.005	.005	.074	.020								
25	76.55	10.68	0.86	0.54	0.50	0.80	4.94	3.33	1.36				0.04		99.60	2.648
A3. III	1.276	.105	.005	.008	.013	.014	.080	.035					—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.)

SUBBRANG 4. DOSODIC. TORDRILLOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	I.3.1.4.⊙	Q 48.42 hy 0.53 or 11.12 ab 35.63 an 1.11 C 1.73	Red Point, St. Thomas, West Indies.	P. T. Cleve.	P. T. Cleve, Sver. Vet. A. K. Hand., IX, No. 12, p. 34, 1871.	Quartz porphyry.	Cf. Högbom, B. G. Inst. Ups., VI, p. 230, (1903), 1905.
11	I.3.1.(3)4.	Q 42.06 hy 1.95 or 19.46 ap 0.34 ab 31.44 C 4.08	Fiddich Bridge, Craig Machie, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VIII, pt. 1, p. 54, 1901.	Granite.	
12	I.3.1(2)4.	Q 41.70 hy 3.57 or 12.23 ab 31.96 an 2.50 C 6.12	St. Johns, Isle of Man.	P. Holland.	Dickson and Holland, Pr. Liv. G. Soc., VI, p. 126, 1889.	Elvanite.	In W. T., p. 131
13	I.3(4).1''4''.	Q 34.80 hy 2.13 or 10.01 mt 0.66 ab 44.54 il 0.30 an 2.78 ap 0.34 C 3.16	East Porthallow, Cornwall.	W. Pollard.	Flett and Hill, Mem. G. S. Eng., Sheet 359, p. 59, 1912.	Granite gneiss.	
14	I.3''1.(3)4.	Q 38.94 di 0.92 or 20.02 hy 3.91 ab 34.58 an 1.39	Ravin des Dames, Meuse, France.	J. de Lapparent	J. de Lapparent, B. Soc. Min. Fr., XXXII, p. 257, 1909.	Microgranite.	Also in Étude Comp. Porph. France, p. 84, 1909.
15	I''3(4).1''4.	Q 34.86 hy 6.86 or 17.24 il 0.46 ab 35.11 an 0.28 C 4.49	St. Clement, Lyonnais, France.	Pisani.	A. Michel-Levy, C. R., CLVI, p. 718, 1913.	Orthophyre.	
16	I.3(4).1''(3)4.	Q 34.74 hy 2.13 or 18.90 mt 1.39 ab 33.54 il 0.15 an 2.22	Colle de la Motte, Esterel, France.	Pisani.	A. Michel-Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 40, 1912.	Pitchstone.	Incomplete in C. R., CL, p. 750, 1910.
17	I.3.1.4.⊙	Q 45.06 hy 2.50 or 11.12 hm 0.93 ab 37.20 an 1.11 C 0.92	Between Canne and Pirio, Corsica.	J. Deprat,	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 61, 1907.	Micropeg- matite.	
18	I.3''1.4.	Q 40.86 hy 0.80 or 11.68 hm 0.77 ab 44.54 an 0.56 C 0.82	Tula Ravine, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 61, 1907.	Micropeg- matite.	
19	I.3''1''4.	Q 37.98 hy 0.90 or 17.79 mt 0.23 ab 34.58 il 0.46 an 3.06 hm 1.12 C 2.96	Dornbach, Blatt Rossdorf, Hesse.	K. M. Jene.	G. Klemm, Erl. G. Kt. Hesse, Bl. Rossdorf, p. 46, 1912.	Aplite.	
20	I.3.1.4.⊙	Q 42.00 hy 1.90 or 12.79 mt 0.70 ab 36.68 il 0.30 an 0.28 hm 1.12 C 2.75	Platta Mala, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. Kte. Schw., XXII, p. 192, 1909.	Aplitic granite.	
21	I.3''1.4.	Q 38.94 hy 0.60 or 17.24 mt 1.86 ab 37.73 il 0.32 an 0.83 C 1.43	Sur Eu, Lower Engadine, Switzerland.	M. Dittrich.	O. Züst, In. Diss. Zür., p. 20, 1905.	Aplite.	
22	I.3''1.(3)4.	Q 38.88 hy 2.15 or 21.13 ab 34.58 an 1.11 C 1.43	Groppo del Vescovo, n. Parma, Italy.	M. Ferrari.	M. Ferrari, Mem. Ac. Linc. (5), VIII, No. 21, p. 730, 1911.	Quartz porphyry.	
23	I''3.1(2).(3)4.	Q 52.86 hy 4.19 or 13.34 ab 22.53 an 2.22 C 3.84	Ku Kli, Amur River, East Siberia.	(?)	K. E. Bogdanovitch, Fund. Marek., p. 57, 1904.	Liparite.	MnO high?
24	I.3.1.4.⊙	Q 46.08 hy 0.40 or 11.12 mt 0.46 ab 38.77 hm 0.48 an 1.39 C 0.61	Thsin-ling Moun- tains above Lan-Kiao, China.	C. Pfeil.	K. Futterer, Durch Asien, II, (2), p. 266, 1909.	Granite.	
25	I''3(4).1''4.	Q 35.16 ac 2.31 or 19.46 ns 0.61 ab 36.68 di 3.19 hy 0.80	Siboem boem, Sumatra.	L. Serrurier.	R. D. M. Verbeek, Sum. Westk., p. 232, 1883.	Quartz porphyry.	Not in W. T.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. ALASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
26	77.81	12.89	n. d.	0.90	0.88	0.05	4.18	2.39	0.44	0.09	0.41		0.08	FeS ₂ 0.21	100.33	2.68
A2. II	1.297	.126	—	.013	.022	.001	.068	.026			.005		.001			
27	74.87	14.14	1.39	0.50	0.25	0.70	5.06	2.18	0.40	0.04	0.05	0.21	0.08	CO ₂ none SO ₃ 0.05 B ₂ O ₃ 0.52	100.35	
A2. II	1.248	.139	.008	.007	.006	.013	.082	.023			—	.001	.001			

RANG 1. ALASKASE.

1	78.28	12.00	n. d.	1.19	0.37	0.29	6.89	none	0.61		0.34			CO ₂ none	99.97	
A3. III	1.305	.118	—	.017	.009	.005	.111	—			.004					
2	80.09	10.80	1.07	0.83	0.58	0.38	5.60	none	0.52	0.24	0.16	0.04	0.02	CO ₂ none ZrO ₂ 0.01 S none BaO none SrO none	100.34	
A1. I	1.335	.106	.007	.011	.015	.007	.090	—			.002	—	—			
3	78.50	11.50	0.11	1.82	0.46	0.50	6.04	none	0.82	0.30	0.27	0.03	0.03	CO ₂ none ZrO ₂ none S 0.13 BaO none SrO none	100.51	
A1. I	1.308	.113	.001	.025	.012	.009	.097	—			.003	—	—			
4	79.64	11.44	0.11	0.30	0.15	0.71	6.40	0.38	0.30	0.16	0.50	0.08	0.08	CO ₂ 0.02	100.27	
A2. II	1.327	.112	.001	.004	.004	.013	.103	.004			.006	—	.001			
5	81.1	10.8	1.2	n. d.	0.1	0.5	5.9	0.5	0.4						100.5	
B3. IV	1.352	.106	.008	(.016)	.003	.009	.095	.005								
6	78.1	12.8	1.7	n. d.	0.7	0.6	5.4	0.7	0.5						100.5	
B3. IV	1.302	.125	.011	(.022)	.018	.011	.087	.008								
7	77.32	11.62	1.57	0.69	0.80	0.62	5.81	0.99	0.65		0.34		0.10		100.51	
A2. II	1.289	.114	.010	.010	.020	.011	.093	.011			.004		.001			
8	83.57	8.01	2.04	n. d.	trace	0.50	4.53	0.16	1.10					S trace	99.91	2.624
A4. IV	1.393	.078	.013	(.026)	—	.009	.072	.002								
9	75.78	11.41	2.31	2.29	0.75	0.87	4.76	0.73	n. d.		0.23	0.81		CO ₂ 0.34 S 0.16	100.44	
A2. II	1.263	.112	.014	.032	.019	.016	.077	.008			.003	.006				
10	78.48	10.26	1.81	0.25	0.53	1.07	5.39	0.37	0.96	0.30	0.52	trace		CO ₂ 0.08	100.02	
A2. II	1.308	.100	.011	.004	.023	.020	.087	.004			.007					
11	77.45	10.16	3.04	0.53	0.47	1.75	5.53	0.40	1.04		0.55	0.06	trace	CO ₂ 0.31 S 0.14	99.43	2.620
A2. II	1.291	.100	.019	.007	.012	.031	.089	.004			.007	—				
12	77.83	10.79	2.35	1.16	0.33	0.19	5.61	0.88	0.67			trace			99.81	
A3. III	1.297	.106	.015	.016	.008	.003	.090	.009								
13	77.44	10.55	2.24	0.34	0.09	0.99	6.23	0.71	0.58	0.33	0.20	0.17	trace		99.91	
A2. II	1.291	.103	.015	.005	.002	.018	.100	.008			.003	.001				
14	78.64	12.79	n. d.	1.14	trace	trace	6.10	0.80	0.41			0.14	trace	CO ₂ trace SO ₃ 0.22	100.24	2.51
A.4 IV	1.311	.125	—	.016	—	—	.098	.009				.001	—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 4. DOSODIC. TORDRILLOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
26	I.3.1.4.⊙	Q 42.00 hy 3.39 or 14.46 il 0.76 ab 35.63 an 0.28 C 3.16	Norseman, West Australia.	E. S. Simpson.	W. D. Campbell, W. Aust. G. S. B. 21, p. 119, 1906.	Felsite.	
27	I.3(4).1''4.	Q 35.52 hy 0.60 or 12.79 mt 1.86 ab 42.97 ap 0.34 an 2.78 C 2.45	Pensini Creek, Orikaka District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Tourmaline pegmatite.	

SUBRANG 5. WESTPHALOSE. (C. I. P. W., 1902.)

1	I.3(4).1.5.	Q 36.42 hy 2.62 ab 58.16 il 0.61 an 1.39 C 0.20	James Township, Cobalt, Ontario.	N. L. Bowen.	N. L. Bowen, Jour. Can. Min. Inst., XII, p. 523 (1909), 1910.	Aplite.	
2	I.3.1''5.	Q 45.84 hy 1.76 ab 47.16 mt 1.62 an 1.95 il 0.30 C 0.92	Shasta King Mine, Shasta County, California.	G. Steiger.	B. S. Butler, A. J. S., XXVIII, p. 29, 1909.	Granite por- phyry.	Epidote pri- mary?
3	I.3''.1(2).5.	Q 40.50 hy 3.97 ab 50.83 mt 0.23 an 2.50 il 0.46 C 0.71	Bully Hill, Shasta County, California.	G. Steiger.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Granite por- phyry.	
4	I.3''.1.5.	Q 39.72 di 0.86 or 2.22 wo 0.46 ab 53.97 il 0.76 an 1.39 hm 0.16 tn 0.20	Skomer Island, Pembrokeshire, Wales.	E. G. Radley.	H. H. Thomas, Q. J. G. S., LXVII, p. 189, 1911.	Soda rhyolite.	Also in Dewey and Flett, G. Mag., (V), VIII, p. 209, 1911.
5	I.3.1.5.⊙	Q 43.08 di 0.71 or 2.78 hy 2.05 ab 49.78 an 1.67	Ravin de Mairus, Ardennes, France.	J. de Lapparent.	J. de Lapparent, B. Soc. Min. Fr., XXXII, p. 257, 1909.	Microgranite.	
6	I.3''.1(2)''5.	Q 40.20 hy 4.70 or 4.45 ab 45.59 an 3.06 C 1.94	Dames de Meuse, Ardennes, France.	J. de Lapparent.	J. de Lapparent, B. Soc. M. Fr., XXXII, p. 257, 1909.	Microgranite.	
7	I.3(4).1(2).(4).5.	Q 37.68 hy 2.00 or 6.12 mt 1.62 ab 48.73 il 0.61 an 3.06 hm 0.48	Gubben, Rödö, Sweden.	Santesson.	P. J. Holmquist, Afh. Sver. G. Und., No. 181, p. 83, 1899.	Granite (albite peg- matite).	In W. T., p. 131. Dike.
8	I''3.1.5.	Q 54.60 di 1.24 or 1.11 hy 2.77 ab 37.73 an 1.11	WiéBELSaal, Westphalia.	Bömer.	Q. Mügge, N. J. B. B., VIII, p. 616, 1893.	Quartz keratophyre.	In W. T., p. 131.
9	I''3.1''5.	Q 43.02 hy 3.88 or 4.45 mt 3.25 ab 40.35 il 0.46 C 2.75 ap 1.68	Rossdorf, Hesse.	Butzbach.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 48, 1912.	Granophyre.	P ₂ O ₅ high?
10	I.3.1''5.	Q 43.20 di 1.73 or 2.22 hy 0.50 ab 45.59 il 0.61 an 2.50 hm 1.81 tn 0.59	Epidauros, Argolis, Greece.	M. Dittrich.	Milch and Reuz, N. J. B. B., XXXI, p. 509, 1911.	Quartz keratophyre.	
11	I''3.1''5.	Q 40.98 di 2.59 or 2.22 wo 1.39 ab 46.11 il 1.06 an 1.95 hm 3.04	Epidauros, Argolis, Greece.	A. Lindner.	Milch and Reuz, N. J. B. B., XXXI, p. 512, 1911.	Quartz keratophyre.	
12	I.3.1''5.	Q 41.28 hy 0.93 or 5.90 mt 3.48 ab 47.16 an 0.83 C 0.41	Marahano, Debaroa, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 110, 1909.	Quartz keratophyre.	
13	I''3''.1''5.	Q 38.16 ac 2.31 or 4.45 di 0.43 ab 49.78 wo 1.51 mt 0.46 il 0.46 hm 1.28 ap 0.34	Copper Island, Commander Is- lands, Bering Sea.	W. Zydmun- tonska.	W. Zygmuntowska, B. Ac. Sc. Crac., 1912, p. 684.	Soda rhyolite.	
14	I.3''.1''5.	Q 39.18 hy 2.11 or 5.00 ab 51.35 C 1.84	Nuthernugie, Barrier Range, New South Wales.	J. C. H. Min- gay.	J. B. Jaquet, Mem. G. S. N. S. W., No. 5, p. 39, 1894.	Felsite.	Not in W. T.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. ALSBACHASE. (C. I. P. W., 1902.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	78.04	11.98	0.23	0.60	0.04	0.62	0.24	6.83	1.41						100.01	
A?3. III	1.301	.117	.001	.008	.001	.011	.004	.072								
2	75.57	10.57	3.30	0.96	0.27	0.67	trace	6.75	1.60			trace	0.23	SO ₃ none	99.92	2.62
A2. II	1.260	.104	.021	.014	.007	.012	—	.072				—	.003			

RANG 2. DOMALKALIC. ALSBACHASE.

1	77.59	10.53	0.21	1.74	1.01	0.76	1.58	5.30	0.60		0.60	0.05	0.03	CO ₂ 0.13 SO ₃ 0.05 BaO 0.06	99.24	
B1. II	1.293	.103	.001	.024	.025	.014	.026	.056			.008	—	—			
2	80.99	10.15	1.38	n. d.	0.33	1.69	1.40	4.24	n. d.				trace		100.18	
A4. IV	1.350	.100	.009	(.018)	.008	.030	.023	.044								
3	72.65	14.23	1.72	1.56	0.42	1.42	1.80	5.35	0.46				0.63		100.24	
A3. III	1.211	.140	.011	.022	.011	.025	.029	.057					.009			
4	69.89	15.20	1.43	1.19	0.82	2.12	1.86	4.89	0.75	0.28	0.01	0.66		SO ₃ 0.85	99.95	
A2. II	1.165	.149	.009	.017	.020	.038	.030	.052			—	.005				
5	73.15	16.74	0.78	n. d.	0.21	0.90	1.13	4.58	2.58					SO ₃ 0.12 FeS ₂ 0.73	100.92	2.436
A4. IV	1.219	.164	.005	(.010)	.005	.016	.018	.049								
6	70.59	17.62	1.74	n. d.	trace	1.96	0.80	5.10	1.61					SO ₃ 0.07 FeS ₂ 0.15	99.64	2.292
A4. IV	1.177	.173	.011	(.022)	—	.035	.013	.055								
7	74.93	11.37	1.34	1.32	0.54	1.24	1.18	6.72	0.75		0.28	0.15	0.09	BaO 0.28	100.19	
A2. II	1.249	.112	.008	.018	.014	.022	.019	.071			.004	.001	.001			
8	72.51	13.47	2.63	0.94	0.52	0.97	0.87	6.59	1.06			0.06	0.15	SO ₃ none N ₂ O none CuO 0.06	99.83	
A2. II	1.209	.132	.016	.013	.013	.017	.014	.070				—	.002			

RANG 2. ALSBACHASE.

1	75.14	12.50	1.20	0.87	0.43	0.83	3.00	3.50	2.55		0.16		trace		100.18	
A3. III	1.252	.123	.008	.012	.011	.015	.048	.037			.002		—			
2	71.85	15.25	1.04	2.56	0.63	2.46	3.18	3.04	0.17		0.58	trace	trace		100.76	
A2. II	1.198	.150	.007	.036	.016	.044	.051	.032			.007	—	—			
3	76.99	12.45	1.03	0.49	0.21	0.98	3.46	4.29	0.26				trace		100.16	
A3. III	1.283	.122	.006	.007	.005	.018	.056	.046								
4	74.47	14.15	1.16	1.21	0.63	1.70	1.97	4.14	0.20	0.06				CO ₂ 0.25 S 0.27	100.21	2.65
A3. III	1.241	.139	.007	.017	.016	.030	.032	.043								

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 1. PERPOTASSIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I.3.(1)2.1.	Q 48.90 hy 1.02 or 40.03 mt 0.23 ab 2.10 an 3.05 C 3.06	Riggenbachthal-Schwarzwald, Baden.	Bunsen's laboratory.	H. Schmidt, Ref. N. J. 1889, I, p. 95.	Porphyry.	In W. T., p. 125.
2	I.3.(1)2.1.	Q 47.82 hy 0.70 or 40.03 mt 3.94 an 3.34 hm 0.64 C 2.04	Nuthernugie, Barrier Range, New South Wales.	H. P. White.	J. B. Jaquet, Mem. G. S. N. S. W., No. 5, p. 40, 1894.	Pitchstone.	Not in W. T.

SUBRANG 2. DOPOTASSIC. MIHALOSE. (C. I. P. W., 1902.)

1	I.3.(1)2.2''.	Q 43.98 hy 4.48 or 31.14 mt 0.23 ab 13.62 il 1.22 an 3.89 C 0.71	Pompton Junction, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R., (1908), p. 66, 1909.	Gneiss.	Included in granite.
2	I.3.2.2''.	Q 51.72 hy 3.18 or 24.46 ab 12.05 an 8.34 C 0.31	Ulfhällarne, Skattmansö, Sweden.	D. Hummel.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	
3	I''3''2.2''.	Q 36.84 hy 3.74 or 31.69 mt 2.55 ab 15.20 an 6.95 C 2.96	Solhem, Fjällbacka, Bohuslän, Sweden.	H. I. P. Hilding.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	Same rock as No. 2, I.4.2.2.
4	I''3''2.2(3).	Q 36.18 hy 3.06 or 28.91 mt 2.09 ab 15.72 ap 1.68 an 5.84 C 4.69	Birkenauerthal, Hessen.	Surv. lab.	G. Klemm, Erl. G. Kte. Hess., Bl. Birkenau, p. 33, 1905.	Granite.	
5	I.3.2.2.⊙	Q 46.20 hy 1.82 or 27.24 ab 9.43 an 4.45 C 8.26	Nagy Mihaly, Hungary.	K. v. Muraközy.	K. v. Muraközy, F. K., XXII, p. 54, 1892.	Rhyolite.	In W. T., p. 131.
6	I.3.2''2.	Q 40.62 hy 2.90 or 30.58 ab 6.81 an 9.73 C 7.14	Nagy Mihaly, Hungary.	K. v. Muraközy.	K. v. Muraközy, F. K., XXII, p. 54, 1892.	Rhyolite.	In W. T., p. 131.
7	I.3''2.2.	Q 39.00 hy 2.32 or 38.48 mt 1.85 ab 9.96 il 0.61 an 5.28 ap 0.34 C 0.31	Schtscheliki, Olonez, Russia.	W. Wahl.	W. Wahl, Fennia, XXIV, No. 3, p. 54, 1908.	Granite.	
8	I.3''2.2.	Q 39.48 hy 1.30 or 38.92 mt 3.48 ab 7.34 hm 0.16 an 4.73 C 3.16	Werkh Issetsk, Mursinsk, Ural Mountains.	G. Katerfeld.	W. Nikitin, Mem. Com. G. Russ., XXII, p. 95, 1907.	Granite.	

SUBRANG 3. SODIPOTASSIC. TEHAMOSE. (C. I. P. W., 1902.)

1	I.3.(1)2.3''.	Q 41.94 hy 1.36 or 20.57 mt 1.86 ab 25.15 il 0.30 an 4.17 C 2.35	Cape Fletcher, Canning Peninsula, East Greenland.	N. Sahlbom.	O. Nordenskiöld, Medd. Grönl., XXVII, p. 199, 1908.	Quartz porphyry.	
2	I''3(4).2''3(4).	Q 34.44 hy 4.50 or 17.79 mt 1.62 ab 26.72 il 1.06 an 12.23 C 2.35	Havnefjord, Jones Sound, Ellesmere Land.	P. Schei.	C. Bugge, Rep. 2d Fram Exped., No. 22, p. 18, 1910.	Hypersthene adamellite.	
3	I.3(4).(1)2.3.	Q 37.74 hy 0.63 or 25.58 mt 1.39 ab 29.34 an 5.00 C 0.20	Livingstone Township, Ontario.	N. N. Evans.	Adams and Barlow, Can. G. S., Mem. No. 6, p. 54, 1910.	Granite gneiss.	
4	I.3.2.''3.	Q 42.30 hy 2.92 or 23.91 mt 1.62 ab 16.77 an 8.34 C 3.47	Rattlesnake Hill, Concord, New Hampshire.	Sherman and Edwards.	T. N. Dale, U. S. G. S. B. 354, p. 150, 1908.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. ALSBACHASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5	75.56	12.61	0.64	1.16	0.05	0.84	2.35	5.93	0.42		0.22	0.05	0.03	CO ₂ 0.19 SO ₃ 0.11 BaO 0.12	100.27	
A1. I	1.259	.124	.004	.016	.001	.015	.038	.063			.003	—	—			
6	75.17	12.55	1.54	1.41	0.21	1.15	3.07	4.62	0.22		0.31	0.04	0.04	ZrO ₂ 0.05 SO ₃ 0.02 BaO 0.10	100.50	
A1. I	1.253	.123	.010	.019	.005	.020	.050	.049			.004	—	—			
7	73.85	13.15	3.27	0.36	0.32	0.82	2.29	5.42	0.71			0.06	0.09		100.34	
A2. II	1.231	.129	.020	.005	.008	.014	.037	.058				—	.001			
8	71.45	14.36	2.07	2.78	1.17	1.58	1.95	3.28	1.30					Li ₂ O trace	99.94	
A3. III	1.191	.142	.013	.039	.029	.029	.031	.035								
9	69.29	14.07	2.59	2.03	1.32	2.76	2.89	2.87	0.37	0.06	0.50	0.26	0.08	CO ₂ trace	99.09	
B2. III	1.153	.138	.016	.028	.033	.049	.047	.031			.008	.002	.001			
10	75.55	14.59	0.46	2.25	0.03	1.10	3.79	2.16	0.40	0.15				CO ₂ 0.03	100.51	
A3. III	1.259	.143	.003	.031	.001	.020	.061	.023								
11	74.46	15.28	1.95	0.74	0.08	0.92	2.57	3.01	0.58						99.59	
A3. III	1.241	.150	.012	.010	.002	.016	.042	.032								
12	74.00	12.04	0.78	2.61	0.42	0.85	3.47	4.33	0.86		0.34	0.06	0.05	Cl trace BaO 0.12 Li ₂ O trace	99.93	2.565
A2. II	1.233	.118	.005	.036	.011	.015	.056	.046			.004	—	—			
13	76.26	12.94	0.69	0.13	0.17	1.10	2.73	5.26	0.43	0.17	0.11	0.06	trace	CO ₂ none S 0.01 Cr ₂ O ₃ none NiO none BaO 0.07 SrO none	100.13	
A1. I	1.271	.127	.004	.002	.004	.020	.044	.056			.001	—	—			
14	74.34	12.97	0.75	0.54	0.86	0.85	2.49	4.72	1.11	1.03	0.18	0.07	trace	CO ₂ none ZrO ₂ 0.05 SO ₃ 0.03 BaO 0.07 SrO trace Li ₂ O trace	100.06	
A1. I	1.239	.127	.005	.007	.022	.015	.040	.050			.002	—	—			
15	75.89	12.27	1.12	1.37	0.29	0.86	3.23	3.42	0.82		0.50	none	none	SO ₃ 0.28 Li ₂ O 0.01	100.06	
A2. II	1.265	.120	.007	.019	.007	.015	.052	.036			.006	—	—			
16	75.34	12.51	0.42	1.55	0.32	1.07	3.31	4.17	0.86		none	none	0.07	SO ₃ 0.42 Li ₂ O trace	100.04	
A2. II	1.256	.122	.003	.022	.008	.020	.053	.045			—	—	.001			
17	71.69	13.29	0.83	4.23	1.28	1.66	2.48	2.37	1.31	0.14	0.59	0.07	0.09	CO ₂ 0.13	100.16	2.773
A2. II	1.195	.130	.005	.058	.032	.029	.040	.025			.007		.001			
18	74.65	14.11	1.08	0.29	0.20	0.80	2.81	4.59	1.40		0.21	trace	0.11	BaO 0.08 SrO trace Li ₂ O none	100.33	
A2. II	1.244	.138	.007	.004	.005	.014	.045	.049			.003	—	.001			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODIOPOTASSIC. TEHAMOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	I.3(4).(1)2.(2)3.	Q 36.78 hy 1.29 or 35.03 mt 0.93 ab 19.91 il 0.46 an 4.17 C 0.82	Charlotteburg, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1908), p. 68, 1909.	Granite gneiss.	
6	I.3(4)''2.3.	Q 36.54 hy 1.16 or 27.24 mt 2.32 ab 26.20 il 0.61 an 5.56 C 0.41	German Valley, Schooley's Moun- tain, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1908), p. 77, 1909.	Granite gneiss.	
7	I.3(4).(1)2.(2)3.	Q 37.50 hy 0.80 or 32.25 mt 1.39 ab 19.39 hm 2.24 an 3.89 C 2.04	Monterey, Frank- lin County, Pennsylvania.	L. G. Eakins.	G. H. Williams, U. S. G. S. B. 148, p. 81, 1897.	Quartz porphyry.	In W. T., p. 127.
8	I''3.2''3.	Q 40.92 hy 6.33 or 19.46 mt 3.02 ab 16.24 an 8.06 C 4.79	Sykesville, Carroll County, Maryland.	W. F. Hille- brand.	G. H. Williams, U. S. G. S. A. R. 15, p. 672, 1895.	Granite.	Cf. C. R. Keyes, op. cit., p. 697. In W. T., p. 133.
9	I(11).3(4).2(3). 3(4).	Q 33.78 hy 3.96 or 17.24 mt 3.71 ab 24.63 il 1.22 an 11.68 ap 0.67 C 1.84	Manchester, Chesterfield County, Virginia.	W. M. Thorn- ton.	T. L. Watson, Va. G. S. B. 1A, p. 81, 1909.	Granite gneiss.	
10	I.3.2.3.⊙	Q 41.16 hy 3.80 or 12.79 mt 0.30 ab 31.96 an 5.56 C 3.98	Observatory Hill, Fox River Valley, Wisconsin.	W. W. Daniells.	Hobbs and Leith, B. Un. Wisc., 158, p. 262, 1907.	Granite porphyry.	
11	I.3.''2.3''.	Q 45.78 hy 0.20 or 17.79 mt 2.32 ab 22.01 hm 0.32 an 4.45 C 6.12	Observatory Hill, Fox River Valley, Wisconsin.	W. W. Daniells.	Hobbs and Leith, B. Un. Wisc., 158, p. 262, 1907.	Aporhyolite.	
12	I''3(4).(1)2.3.	Q 33.18 hy 4.66 or 25.58 mt 1.16 ab 20.34 il 0.61 an 4.17 C 0.10	Pigeon Point, Minnesota.	W. F. Hille- brand.	W. S. Bayley, A. J. S., XXXVII, p. 59, 1889.	Quartz kerato- pyre.	Also in U. S. G. S. B. 109, p. 56, 1893. In W. T., p. 161.
13	I.3(4)''2.3.	Q 37.62 hy 0.40 or 31.14 mt 0.23 ab 23.06 il 0.15 an 5.56 hm 0.48 C 0.71	Black Butte, Elkhorn District, Montana.	H. N. Stokes.	J. S. Barrell, U. S. G. S. A. R. 22, (II), p. 540, 1901.	Aplite.	
14	I.3''.(1)2.3.	Q 38.82 hy 2.20 or 27.80 mt 1.16 ab 20.96 il 0.30 an 4.17 C 2.24	Hyde Park Dike, Butte District, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. P. P. 74, p. 44, 1912.	Rhyolite.	In W. T., p. 133.
15	I.3.(1)2.3''.	Q 41.64 hy 1.49 or 20.02 mt 1.62 ab 27.25 il 0.91 an 4.17 C 1.73	Mount Sheridan, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 426, 1899.	Rhyolite.	In W. T., p. 133.
16	I.3(4)''2.3.	Q 36.00 hy 3.44 or 25.02 mt 0.70 ab 27.77 an 5.56 C 0.41	Elephants Back, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S., Mon. 32, (II), p. 426, 1899.	Rhyolite.	In W. T., p. 133.
17	I(II).3.2''3(4).	Q 40.04 hy 9.40 or 13.90 mt 1.16 ab 20.96 il 1.06 an 8.06 C 3.67	Moyie Sill, Purcell Moun- tains, British Columbia.	M. Dittrich.	R. A. Daly, A. J. S., XX, p. 193, 1905.	Granite.	Also in Rosenb. Fests., p. 213, 1906; Can. G. S., Mem. 38, (I), p. 229, 1912.
18	I.3''.(1)2.3.	Q 38.82 hy 0.50 or 27.24 mt 0.46 ab 23.58 il 0.46 an 3.89 hm 0.80 C 3.06	Deer Creek Meadows, Tehama County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 192, 1897.	Rhyolite.	In W. T., p. 133.

CLASS I. PERSALANE—Continued.

RANG 2. ALSBACHASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
19	73.62	14.24	0.93	0.67	0.33	1.07	3.25	4.28	1.29		0.21	0.02	0.08	BaO 0.10 SrO trace Li ₂ O none	100.09	
A2. II	1.227	.140	.006	.009	.008	.020	.052	.046			.003	—	.001			
20	72.31	13.79	1.54	0.26	0.56	1.08	2.56	4.66	n. d.		0.27	0.07			97.10	
A3. III	1.205	.135	.010	.004	.014	.019	.041	.050			.003	—				
21	73.81	13.93	0.93	0.46	0.72	0.88	2.80	4.81	0.74		0.62	0.06	0.24	ZrO ₂ trace Cl 0.02 FeS ₂ 0.02 CoO 0.28 BaO 0.01 Cu trace Pb none	100.33	
A1. I	1.230	.136	.006	.006	.018	.016	.045	.051			.008	—	.003			
22	75.39	13.62	0.70	n. d.	trace	1.84	2.77	4.39	1.21						99.92	
A4. IV	1.256	.133	.004	(.008)	—	.033	.045	.047								
23	72.78	12.86	3.14	0.26	0.83	0.92	2.31	4.14	1.89	1.05	0.19	0.14	0.09	ZrO ₂ 0.03 BaO 0.05 Li ₂ O trace	100.68	
A1. I	1.213	.126	.020	.004	.021	.016	.037	.044			.002	.001	.001			
24	71.42	15.32	3.48	0.21	0.71	1.75	2.77	3.65	0.74					Cl 0.07	100.12	
A3. III	1.190	.150	.022	.002	.018	.031	.045	.039								
25	73.90	12.50	0.62	1.80	1.33	1.26	2.95	3.70	1.10		0.73	trace			99.89	
A2. II	1.232	.123	.004	.025	.033	.022	.048	.039			.009	—				
26	75.20	14.40	0.85	n. d.	1.02	1.02	2.68	3.32	1.12						99.61	
A4. IV	1.253	.141	.005	(.010)	.026	.018	.044	.035								
27	76.21	12.66	2.98	1.46	0.10	1.15	1.64	3.27	0.18	0.35			0.08	CO ₂ 0.09	100.17	
A3. III	1.270	.124	.019	.020	.003	.021	.026	.035					.001			
28	72.11	13.71	0.29	0.90	0.44	1.44	3.22	3.33	4.19						99.63	2.346
A3. III	1.202	.134	.002	.012	.011	.026	.051	.035								
29	81.17	8.16	1.56	0.77	0.71	1.40	2.17	2.94	0.62		0.30		0.41		100.21	
A2. II	1.353	.080	.010	.011	.018	.025	.035	.031			.004		.006			
30	77.40	13.48	0.98	n. d.	0.14	0.91	3.27	4.28	0.30						100.76	
A4. IV	1.290	.132	.006	(.012)	.004	.016	.053	.045								
31	76.90	12.53	0.99	0.66	0.17	0.86	2.36	4.92	0.43		0.50		0.08		100.40	
A2. II	1.282	.123	.006	.009	.004	.015	.038	.052			.006		.001			
32	76.45	11.64	0.98	1.03	0.38	1.30	2.40	4.85	0.56		0.12	0.07	0.06	BaO 0.07	99.91	
A2. II	1.274	.114	.006	.014	.010	.023	.039	.052			.002	—	.001			
33	75.72	10.77	1.71	1.62	1.12	2.14	1.75	3.86	0.98		0.26	0.08	0.13	BaO 0.06	100.20	
A2. II	1.262	.106	.011	.022	.028	.038	.028	.041			.003	—	.002			
34	75.67	13.74	0.67	0.72	0.25	0.90	2.60	4.85	0.64		0.29		none		100.33	
A2. II	1.261	.134	.004	.010	.006	.016	.042	.052			.004		—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODI-POTASSIC. TEHAMOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
19	I.3(4)."2.3.	Q 35.40 hy 0.93 or 25.58 mt 1.39 ab 27.25 il 0.46 an 5.56 C 2.24	Slate Creek, Tehama County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 192, 1897.	Rhyolite.	In W. T., p. 133.
20	I.3(4)."2.3.	Q 36.42 hy 1.40 or 27.80 mt 0.23 ab 21.48 il 0.46 an 5.28 hm 1.44 C 2.55	Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 57, 1905.	Rhyolite- dacite.	Low sum due to water.
21	I.3(4).(1)2.3.	Q 36.24 hy 1.80 or 28.36 mt 0.23 ab 23.58 il 1.22 an 4.85 hm 0.80 C 2.45	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Gold f. Brit. Guiana, p. 76, 1908.	Granite.	In W. T., p. 133.
22	I.3(4).2.3.	Q 37.80 hy 1.06 or 26.13 ab 23.58 an 9.17 C 0.82	Craigellachie Bridge, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VIII, (1), p. 54, 1901.	Granite.	
23	I.3(1)2.3.	Q 40.80 hy 2.10 or 24.46 mt 0.70 ab 19.39 il 0.30 an 3.61 hm 2.72 C 3.26 ap 0.34	Woodhouselee, Pentland Hills, Scotland.	W. Pollard.	J. S. Flett, Mem. G. S. Scotl., G. Edinb., p. 39, 1910.	Rhyolite.	
24	I.3(4).2.3.	Q 36.36 hy 1.80 or 21.68 mt 0.70 ab 23.58 hm 3.04 an 8.62 C 3.57	Loch Moy, Invernesshire, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VIII, p. 54, 1901.	Granite.	
25	I''3''2.3.	Q 37.26 hy 4.88 or 21.68 mt 0.93 ab 25.15 il 1.37 an 6.12 C 1.43	Pooté, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 41, 1913.	Microgranite.	
26	I.3."2.3.	Q 42.42 hy 3.92 or 19.46 ab 23.06 an 5.00 C 4.49	Between Sannat and Reterre, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Microgranite.	
27	I."3.2."3.	Q 51.48 hy 0.43 or 19.46 mt 4.41 ab 13.62 an 5.84 C 4.28	San Dionisio, Huelva, Spain.	Not stated.	A. M. Finlayson, Ec. Geol., V, p. 407, 1910.	Porphyry.	
28	I.3''2.3'.	Q 36.78 hy 2.42 or 19.46 mt 0.46 ab 26.72 an 7.23 C 2.24	Faro del Caralete, Cabo de Gata, Spain.	A. Osann.	A. Osann, Z. D. G. G., XLIII, p. 693, 1891.	Liparite.	In W. T., p. 133.
29	I''3''2.3.	Q 53.82 di 2.44 or 17.24 hy 1.03 ab 18.34 mt 2.32 an 3.89 il 0.61	Stora Bergen, Oskarshamn, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
30	I.3''(1)2.3.	Q 39.24 hy 1.98 or 25.02 ab 27.77 an 4.45 C 1.84	Greksasars, Nora, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
31	I.3(1)2."3.	Q 42.48 hy 0.40 or 28.21 mt 0.93 ab 19.91 il 0.91 an 4.17 hm 0.32 C 1.84	Grafversfors, Stofsjö, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 264, 1906.	Granite.	
32	I.3''2."3.	Q 39.90 hy 1.92 or 28.91 mt 1.39 ab 20.44 il 0.30 an 6.39	Mörtsjön, Skattmansö, Sweden.	Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	
33	I''3.2''(2)3.	Q 44.10 hy 4.25 or 22.80 mt 2.55 ab 14.67 il 0.46 an 10.29	Kiista, Sala, Westmanland, Sweden.	Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 264, 1906.	Granite.	
34	I.3''(1)2.3.	Q 39.42 hy 0.86 or 28.91 mt 0.93 ab 22.01 il 0.61 an 4.45 C 2.55	Örnsköldsvik, Angermanland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. ALSBACHASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
35	75.64	12.46	0.41	0.80	0.44	1.32	2.35	5.47	0.66		0.12		0.55		100.22	
A2. II	1.261	.122	.003	.011	.011	.023	.038	.059			.002		.008			
36	75.48	12.22	1.70	0.63	0.57	2.01	2.73	3.19	0.64		0.14		0.29		99.60	
A2. II	1.258	.120	.011	.009	.014	.036	.044	.034			.002		.004			
37	75.07	12.24	1.65	1.04	0.45	0.99	3.13	4.57	0.87		0.26	0.19	0.09		100.55	
A2. II	1.251	.120	.010	.014	.011	.018	.050	.049			.003	.001	.001			
38	74.73	13.73	2.04	n. d.	0.52	1.45	2.60	4.93	0.59						100.59	
A4. IV	1.246	.135	.013	(.026)	.013	.026	.042	.052								
39	74.17	12.78	1.62	1.12	0.27	1.67	2.87	4.02	0.77		0.91		0.17		100.37	
A2. II	1.236	.125	.010	.015	.007	.030	.047	.042			.011		.002			
40	72.33	15.90	1.58	0.55	0.33	1.45	2.44	4.02	0.75		0.45		0.12		99.92	
A2. II	1.206	.156	.010	.008	.008	.026	.039	.042			.006		.002			
41	72.85	13.79	0.69	1.63	0.79	1.76	2.56	4.54	0.91						99.52	
A3. III	1.214	.135	.004	.022	.020	.031	.041	.048								
42	75.81	11.22	0.86	1.91	0.34	1.25	2.27	5.49	0.40		0.32	trace	trace		99.87	
A2. II	1.264	.110	.005	.026	.009	.022	.037	.059			.004	—	—			
43	70.33	11.82	3.73	2.38	0.20	2.55	2.41	3.08	1.38		1.03	0.53		CO ₂ 0.13 CaF ₂ 0.28	99.85	
A2. II	1.172	.116	.023	.033	.005	.046	.039	.033			.013	.004				
44	76.91	12.52	0.45	1.04	0.32	0.75	3.21	3.50	0.72						99.42	
B3. IV	1.282	.123	.003	.014	.008	.013	.052	.037								
45	76.95	13.26	1.38	n. d.	0.48	1.22	2.18	4.17	0.35				trace		99.99	2.516
A3. III	1.283	.130	.009	(.018)	.012	.021	.035	.045								
46	76.44	13.78	0.97	0.07	0.34	0.75	2.76	3.50	0.35	0.33	none	0.51		SO ₂ 0.25	100.08	
A2. II	1.274	.135	.012	.001	.009	.014	.045	.037			—	.004				
47	76.12	12.18	1.21	0.72	1.12	1.54	2.55	3.21	1.51						100.16	
A3. III	1.269	.119	.007	.010	.028	.028	.041	.034								
48	75.21	12.15	1.74	0.38	0.89	1.23	2.88	4.25	0.92						99.65	
A3. III	1.254	.119	.011	.005	.022	.021	.047	.046								
49	74.41	13.65	0.65	0.95	0.87	1.16	2.56	3.98	1.50						99.73	
A3. III	1.240	.134	.004	.014	.022	.021	.041	.042								
50	72.37	15.18	1.75	0.71	1.54	2.01	2.12	3.54	1.11						100.33	
A3. III	1.206	.148	.011	.010	.039	.036	.034	.037								

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODI POTASSIC. TEHAMOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
35	I.3(4).2.(2)3.	Q 36.48 hy 2.95 or 32.80 mt 0.70 ab 19.91 il 0.30 an 6.39 C 0.20	Lien, Strömstad, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
36	I.3.2''/3.	Q 42.24 hy 1.40 or 18.90 mt 2.55 ab 23.06 il 0.30 an 10.01 C 0.61	Öja, Huseby, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
37	I.3(4).(1)2.3.	Q 36.84 hy 1.36 or 27.24 mt 2.32 ab 26.20 il 0.46 an 4.17 ap 0.34 C 0.61	Slirud, Svanskog, Wermland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 264, 1906.	Granite.	
38	I.3(4).2.3.	Q 35.46 hy 4.73 or 28.01 ab 22.01 an 7.23 C 1.53	Ölsjön, Nora, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
39	I.3(4).2.3.	Q 38.10 hy 0.70 or 23.35 mt 1.39 ab 24.63 il 1.67 an 8.34 hm 0.64 C 0.61	Dyne, Strömstad, Bohuslän, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
40	I.3''2.3.	Q 39.60 hy 0.80 or 23.35 mt 0.93 ab 20.44 il 0.91 an 7.23 hm 0.96 C 5.00	Ledingberget, Granninge, Åkermanland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
41	I.3(4).2.3.	Q 34.80 hy 4.38 or 26.69 mt 0.93 ab 21.48 an 8.62 C 1.53	Ornö, Hufvud, Sweden.	O. Bäckström.	A. G. Högbom, B. G. Inst. Ups., X, p. 166, 1911.	Granite.	
42	I.3(4).(1)2.(2)3.	Q 37.56 di 1.89 or 32.80 hy 2.18 ab 19.39 mt 1.16 an 3.89 il 0.61	Pytterlaks, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Finl., No. 15, p. 18, 1905.	Rapakivi granite.	
43	I''3.2''/3.	Q 40.14 hy 0.50 or 18.35 mt 4.64 ab 20.44 il 1.98 an 9.17 hm 0.48 C 1.12 ap 1.34	Dagö, Esthonia.	Ungern-Stern- berg.	V. Hackmann, B. C. G. Finl., No. 15, p. 22, 1905.	Rapakivi granite.	
44	I.3(1)2.3''.	Q 42.18 hy 2.25 or 20.57 mt 0.70 ab 27.25 an 3.61 C 2.14	Grosssachsener Thal, Odenwald.	Dieckmann.	K. Futterer, Mt. Bad. G. L.-A., II, p. 41 (1890), 1893.	Granite.	In W. T., p. 135.
45	I.3.2.3.⊙	Q 43.86 hy 3.58 or 25.02 ab 18.34 an 5.84 C 2.96	Bohnstädtberg, Hessen.	F. W. Schmidt.	C. Chelius, Erl. G. Kte. Hess., Bl. Rossdorf, p. 54, 1886.	Granite.	In W. T., p. 135.
46	I.3(1)2.3.	Q 46.38 hy 0.90 or 20.57 mt 0.23 ab 23.58 hm 1.76 C 5.41 ap 1.34	Lindenstein, Hessen.	R. Marzahn.	Chelius and Klemm, Erl. G. Kte. Hess., IV, p. 42, 1896.	Granite.	In W. T., p. 129.
47	I.3.2.3.⊙	Q 43.92 hy 3.20 or 18.90 mt 1.62 ab 21.48 an 7.78 C 1.63	Abruzzen, n. Cunersdorf, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 191, 1889.	Granite.	In W. T., p. 135.
48	I.3(4)''2.3.	Q 37.92 hy 2.20 or 25.58 mt 1.16 ab 24.63 hm 0.96 an 5.84 C 0.51	Abruzzen, n. Cunersdorf, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 191, 1889.	Granite.	In W. T., p. 135.
49	I.3.2.3.⊙	Q 40.08 hy 3.52 or 23.35 mt 0.93 ab 21.48 an 5.84 C 3.06	Hohesrad, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 190, 1889.	Granite.	In W. T., p. 135.
50	I.3.2''3.	Q 40.14 hy 3.90 or 20.57 mt 2.32 ab 17.82 hm 0.16 an 10.01 C 4.18	Abruzzen, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 163, 1889.	Granite.	In W. T., p. 135.

CLASS I. PERSALANE—Continued.

RANG 2. ALSBACHASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
51	72.15	13.56	1.29	1.48	1.52	2.25	2.74	3.55	1.11						99.65	
A3. III	1.203	.133	.008	.021	.038	.040	.044	.038								
52	72.04	15.98	1.08	1.70	1.08	2.11	2.22	3.45	0.66						100.32	
A3. III	1.201	.157	.007	.024	.027	.038	.035	.037								
53	71.4	14.3	2.2	1.8	1.9	2.2	2.1	3.2	0.9						100.0	
B3. IV	1.190	.140	.014	.025	.048	.039	.034	.034								
54	74.19	13.45	1.28	2.72	0.35	1.01	2.77	4.45	0.16		0.02	0.19			100.59	
A2. II	1.237	.132	.008	.038	.009	.018	.045	.048			—	.001				
55	73.80	10.82	2.45	3.19	0.87	1.90	2.92	3.85	0.33		trace	0.16			100.29	
A2. II	1.230	.106	.015	.044	.022	.034	.047	.041				.001				
56	74.56	13.70	1.31	0.97	0.58	0.95	2.69	4.82	1.02						100.60	
A3. III	1.243	.134	.008	.014	.015	.017	.044	.051								
57	73.23	14.37	0.18	1.87	0.62	2.29	2.15	3.09	1.30		0.42	0.26	trace		99.78	
A2. II	1.221	.141	.001	.026	.016	.041	.035	.033			.005	.002	—			
58	77.15	13.03	2.05	0.31	0.23	1.17	3.03	3.19	0.05						100.21	
A3. III	1.286	.128	.013	.004	.006	.021	.048	.033								
59	74.72	13.82	1.42	1.07	0.18	0.91	2.48	4.82	0.93			0.01		S 0.28	100.64	
A3. III	1.245	.136	.009	.015	.005	.016	.040	.051				—				
60	74.66	13.59	0.08	0.68	0.24	2.47	3.32	3.52	0.36		trace	1.43			100.35	2.626
A3. III	1.244	.133	.001	.009	.006	.045	.053	.037			—	.010				
61	72.26	15.20	0.97	1.67	0.61	2.41	2.99	2.65	0.91		0.02		trace		99.69	2.711
A3. III	1.204	.149	.006	.023	.015	.043	.048	.029			—		—			
62	74.40	12.85	1.60	1.60	0.70	1.10	3.40	3.55	0.55		0.05	0.15	0.10	ZrO ₂ 0.10	100.15	
A2. II	1.240	.126	.010	.022	.018	.020	.055	.038			—	.001	.001			
63	70.62	15.14	0.75	2.48	1.39	1.27	2.53	4.37	1.55	0.05	0.30				100.45	
A3. III	1.177	.148	.005	.035	.035	.023	.040	.047			.004					
64	78.44	11.87	0.59	1.12	0.10	0.80	3.19	3.36	1.04	0.02	0.20				100.73	2.68
A3. III	1.307	.116	.004	.015	.003	.014	.052	.036			.003					
65	72.33	13.16	0.95	1.09	0.14	3.23	3.65	3.41	1.20	trace	0.18	0.70	0.02		100.06	2.67
A2. II	1.206	.129	.006	.015	.004	.057	.059	.036			.002	.005	—			
66	74.51	13.75	1.53	n. d.	0.65	2.41	3.22	3.01	1.05	0.41	0.18	trace		S trace	100.72	
A3. III	1.242	.135	.010	(.020)	.016	.043	.052	.032			.002	—				

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODIOTASSIC. TEHAMOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
51	I''3(4).2''3.	Q 34.80 hy 5.52 or 21.13 mt 1.86 ab 23.06 an 11.12 C 1.12	Heidelberg, n. Krümmhübel, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 164, 1889.	Granite.	In W. T., p. 135.
52	I.3.2''3.	Q 38.94 hy 4.94 or 20.57 mt 1.62 ab 18.34 an 10.56 C 4.79	Sauberg, n. Schmiedeberg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 167, 1889.	Granite.	In W. T., p. 135.
53	I(11).3.2(3).3.	Q 38.70 hy 6.25 or 18.90 mt 3.25 ab 17.82 an 10.84 C 3.37	Gablonz, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 164, 1902.	Granite.	
54	I''3(4).(1)2.3.	Q 36.60 hy 4.86 or 26.69 mt 1.86 ab 23.58 ap 0.34 an 4.17 C 2.45	Nossert, n. Wunsiedel, Fichtelgebirge.	H. Oberembt.	H. Oberembt, In. Diss. Erl., p. 33, 1905.	Granite gneiss.	
55	I(11).3''.''2.3.	Q 36.12 di 3.03 or 22.80 hy 4.50 ab 24.63 mt 3.48 an 5.00 ap 0.34	Vordorf, n. Wunsiedel, Fichtelgebirge.	H. Oberembt.	H. Oberembt, In. Diss. Erl., p. 33.	Granite gneiss.	
56	I.3(4).(1)2.3.	Q 37.08 hy 2.29 or 28.36 mt 1.86 ab 23.06 an 4.73 C 2.24	Vockenhausen, Taunus Mountains.	R. Reinisch.	R. Reinisch, Habil. Schrift, Leipz., p. 28, 1902.	Quartz porphyry.	
57	I.3.2''3.	Q 42.54 hy 4.24 or 18.35 mt 0.23 ab 18.34 il 0.76 an 9.45 ap 0.67 C 3.98	Maissau, Lower Austria.	F. Mocker.	F. Mocker, T. M. P. M., p. 342, 1910.	Granite.	
58	I.3.2.3''.	Q 45.12 hy 0.60 or 18.35 mt 0.93 ab 25.15 hm 1.44 an 5.84 C 2.65	Vlegyasza Mountains, Hungary.	R. Lunzer.	G. Szadeczky, Ref. N. J., 1903, II, p. 72.	Rhyolite.	
59	I.3''.(1)2.3.	Q 39.36 hy 1.29 or 28.36 mt 2.09 ab 20.96 an 4.45 C 2.96	Avignatal, Vintschgau, Tyrol.	C. v. John.	Hammer and v. John, Jb. G. R.-A. Wien, LIX, p. 714, 1910.	Granite.	
60	I.3''.(1)2.3''.	Q 39.96 hy 1.66 or 20.57 mt 0.23 ab 27.77 ap 3.36 an 3.34 C 3.16	Burg Kopel, n. Tanbers, Rieserferner, Tyrol.	R. Pfohl.	F. Becke, Ds. Ak. W. Wien, LXXV (1), p. 160, 1913.	Tonalite aplite.	
61	I.3''2(3).3(4).	Q 37.44 hy 3.74 or 16.12 mt 1.39 ab 25.15 an 11.95 C 2.96	Brugger Alp, Rieserferner, Tyrol.	E. Zdarek.	F. Becke, Ds. Ak. W. Wien, LXXV (1), p. 160, 1913.	Tonalite porphyrite.	
62	I''3(4).(1)2.3''.	Q 37.02 hy 3.52 or 21.13 mt 2.32 ab 28.82 ap 0.34 an 4.73 C 1.63	Nünistock, Aarmassif, Switzerland.	J. Königsberger.	J. Königsberger, N. J. B. B., XIV, p. 55, 1901.	Protogine granite.	
63	I''3(4).2.3.	Q 32.88 hy 6.93 or 26.13 mt 1.16 ab 20.96 il 0.61 an 6.39 C 3.88	Suretta Massif, Switzerland.	N. Sahlbom.	H. Meyer, In. Diss. Freib., p. 14, 1909.	Porphyry.	
64	I.3(1)2.3''.	Q 44.40 hy 1.36 or 20.02 mt 0.93 ab 27.25 il 0.46 an 3.89 C 1.43	Margun Surra, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite.	
65	I.3(4).2.3(4).	Q 33.06 di 1.43 or 20.02 hy 0.90 ab 30.92 mt 1.39 an 9.45 il 0.30 ap 1.68	Pontresina, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Adamellite.	
66	I.3(4).2''3(4).	Q 37.08 hy 3.98 or 17.79 il 0.46 ab 27.25 an 11.95 C 0.82	San Piero in Campo, Elba.	G. d'Achiardi.	G. d'Achiardi, Mem. A. d'Archiardi, p. 112, 1903.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. ALSBACHASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
67	81.08	11.23	none?	none?	trace	0.95	3.50	3.25	0.60						100.61	
A74. IV	1.351	.110	—	—	—	.017	.056	.035								
68	73.87	15.00	1.30	n. d.	0.19	1.46	3.02	4.33	0.66						99.83	
A4. IV	1.231	.147	.008	(.016)	.005	.027	.048	.043								
69	72.61	11.35	1.19	0.44	0.20	1.03	1.88	4.00	5.13	1.37	0.23	0.15			99.58	
A2. II	1.210	.111	.008	.006	.005	.018	.030	.043			.003	.001				
70	70.75	11.39	2.48	1.09	0.14	1.43	3.10	3.98	4.41	0.30	0.46	0.07			99.60	
A2. II	1.179	.112	.016	.015	.004	.025	.050	.042			.006	—				
71	75.84	11.14	4.68	0.01	0.27	1.04	2.69	3.92	0.64	0.02					100.25	2.626
A73. III	1.264	.109	.029	—	.007	.019	.044	.041								
72	75.04	14.88	0.41	0.68	0.70	1.02	2.32	3.84	0.30	0.06	none	0.63	0.22	CO ₂ none	100.13	2.63
A2. II	1.251	.146	.003	.009	.018	.018	.037	.040			—	—	0.03	FeS ₂ 0.03		
73	75.23	14.25	0.78	1.50	0.29	1.45	2.10	2.32	0.34	0.26	0.20	0.05	0.36	ZrO ₂ 0.07 S 0.12	99.32	2.650
B1. II	1.254	.140	.005	.021	.007	.026	.034	.024			.003	—	.005			
74	74.78	13.66	0.30	0.96	1.34	1.90	2.74	2.75	0.55	0.15	0.13	0.19	0.33	ZrO ₂ 0.02 S 0.08	99.88	2.620
A1. I	1.246	.134	.002	.014	.034	.034	.044	.030			.002	.001	.005			
75	74.42	13.97	0.30	1.80	0.29	2.05	3.05	3.40	0.52		0.27	0.21	0.07	ZrO ₂ 0.02 S 0.04	100.41	
A1. I	1.240	.137	.002	.025	.007	.037	.049	.036			.004	.002	.001			
76	74.38	14.33	0.26	1.40	0.17	1.80	3.10	3.48	0.91		0.18	0.15	0.11	ZrO ₂ 0.05 S 0.03	100.35	
A1. I	1.240	.140	.002	.019	.004	.032	.050	.037			.002	.001	.002			
77	73.17	15.24	0.28	1.43	0.28	1.82	3.15	3.54	0.70		0.20	0.17	0.13	ZrO ₂ 0.02 S 0.03	100.21	
A1. I	1.220	.149	.002	.019	.007	.032	.051	.037			.003	.001	.002			
78	74.41	13.81	0.75	1.19	0.83	2.38	2.08	2.01	0.68	0.22	0.20	0.36	0.18	ZrO ₂ 0.05 S 0.12	99.27	2.623
B1. II	1.240	.135	.005	.017	.021	.043	.034	.022			.003	.003	.003			
79	72.65	14.20	0.73	2.38	0.30	2.22	2.63	2.69	0.75	0.15	0.40	0.15	0.48	ZrO ₂ 0.05 S 0.08	99.86	2.653
A1. I	1.211	.139	.005	.033	.008	.039	.042	.029			.005	.001	.007			
80	77.47	11.00	1.04	2.02	0.43	1.02	2.86	4.14	0.20	0.05	0.26	none	none		100.59	
A2. II	1.291	.108	.007	.028	.011	.018	.046	.044			.003	—	—			
81	75.72	12.55	0.44	1.43	trace	1.41	2.73	4.81	0.36		0.20		trace		99.65	
A3. III	1.261	.123	.003	.019	—	.025	.044	.051			.003					
82	74.80	14.32	0.88	1.00	trace	1.26	3.38	3.28	1.24		0.21				100.37	
A2. III	1.247	.140	.006	.014	—	.022	.055	.035			.003					

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 3. SODIPOTASSIC. TEHAMOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
67	I.3.''2.3(4).	Q 46.26 or 19.46 ab 29.34 an 4.73 C 0.20	Dych-Ssu Glacier, Caucasus.	D. Beljankin.	F. Loewinson-Lessing, Vh. Russ. Min. Ges., XLII, p. 268, 1905.	Greisen.	
68	I.3(4).2.3.	Q 35.52 hy 2.61 or 25.58 ab 25.15 an 7.51 C 2.65	Sidi Zerzor, n. Menerville, Algeria.	Not stated.	Dupare, Pearse, and Ritter, Mem. Soc. Phys. Gen., XXXIII, p. 115, 1900.	Liparite.	In W.T., p. 135.
69	I.3.''2.''3.	Q 44.22 hy 0.50 or 23.91 mt 0.70 ab 15.72 il 0.46 an 4.17 hm 0.80 C 2.35 ap 0.34	Manambaho, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Pitchstone.	
70	I.3(4)''2.3.	Q 34.74 di 0.93 or 23.35 mt 2.09 ab 26.20 il 0.91 an 5.56 hm 1.06	Itonovondro, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Pitchstone.	
71	I.3.''2.3.	Q 42.66 hy 0.70 or 22.80 hm 4.68 ab 23.06 an 5.28 C 0.51	Roodepoortje, Transvaal.	H. Eckstein & Co.	Horwood and Wade, Geol. Mag. (V), VI, No. 12, p. 551, 1909.	Granite.	
72	I.3.2.3.⊙	Q 43.56 hy 2.99 or 22.24 mt 0.70 ab 19.91 ap 0.63 an 5.00 C 5.20	Zeia River, Amur District, Siberia.	P. Todakis.	E. Ahmert, Reg. Aurif. Sib., X, Tab. VII, 1910.	Garnet pegmatite.	P ₂ O ₅ is Ca ₄ (PO ₄) ₃
73	I.''3.2.3''.	Q 49.74 hy 3.22 or 13.34 mt 1.16 ab 17.82 il 0.46 an 7.23 C 5.71	Kurahashijima, Aki, Japan.	N. Yoshioka.	S. Kozu, pers. com.	Granite.	
74	I.''3.2''3''.	Q 41.46 hy 5.38 or 16.68 mt 0.46 ab 23.06 il 0.30 an 8.62 ap 0.34 C 2.96	Inushima, Asahi, Japan.	N. Yoshioka.	S. Kozu, pers. com.	Granite.	
75	I.3''2.3''.	Q 38.58 hy 3.34 or 20.02 mt 0.46 ab 25.68 il 0.61 an 8.34 ap 0.67 C 2.24	Ikegame, Nishi-ibaraki, Hitachi, Japan.	T. Ohashi.	S. Kozu, pers. com.	Granite.	
76	I.3''2.3.	Q 38.34 hy 2.64 or 20.57 mt 0.46 ab 26.20 il 0.30 an 8.06 ap 0.34 C 2.45	Inada, Nishi-ibaraki, Hitachi, Japan.	T. Ohashi.	S. Kozu, pers. com.	Granite.	
77	I.3(4).2.3''.	Q 36.66 hy 2.81 or 20.57 mt 0.46 ab 26.72 il 0.46 an 8.06 ap 0.34 C 3.26	Inada, Nishi-ibaraki, Hitachi, Japan.	T. Ohashi.	S. Kozu, pers. com.	Granite.	
78	I.''3.2(3).3(4).	Q 48.30 hy 3.68 or 12.23 mt 1.16 ab 17.82 il 0.46 an 9.17 ap 1.01 C 4.69	Yashima, Harima, Japan.	N. Yoshioka.	S. Kozu, pers. com.	Granite.	
79	I.''3.2''3''.	Q 40.50 hy 4.76 or 16.12 mt 1.16 ab 22.01 il 0.76 an 10.01 ap 0.34 C 3.26	Kaerushima, Suo, Japan.	N. Yoshioka.	S. Kozu, pers. com.	Granite.	
80	I.3''''2.3.	Q 41.22 hy 3.34 or 24.46 mt 1.62 ab 24.10 il 0.46 an 5.00	St. Thomas Mount, Madras, India.	H. S. Washing- ton.	H. S. Washington, A. J. S., XLI, p. 325, 1916.	Charnockite (hyper- sthene granite).	
81	I.3(4).2.3.	Q 37.68 hy 1.72 or 28.36 mt 0.70 ab 23.06 il 0.46 an 6.95 C 0.31	Kawah-manoek Volcano, Preanger District, Java.	Ledeboer.	R. D. M. Verbeek, Jb. Mijnw., XXXVII, p. 93, 1908.	Obsidian.	
82	I.3''2.3(4).	Q 39.48 hy 0.50 or 19.46 mt 1.39 ab 28.82 il 0.46 an 6.12 C 2.46	Kawa-manoek Volcano, Preanger District, Java.	Ledeboer.	R. D. M. Verbeek, Jb. Mijnw., XXXVII, p. 93, 1908.	Obsidian.	

CLASS I. PERSALANE—Continued.

RANG 2. ALSBACHASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
83	78.01	12.10	0.77	0.93	0.20	0.70	2.82	3.66	0.65		trace				99.84	
A3. III	1.800	.119	.005	.013	.005	.013	.045	.039								
84	75.78	12.42	0.55	1.08	0.50	1.06	3.20	4.60	0.44	0.14	0.29	0.10	0.07	CO ₂ 0.01 ZrO ₂ none SO ₃ 0.08 Cl trace F, S, none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.03 SrO, tr.	100.35	2.626
A1. I	1.263	.122	.003	.015	.013	.019	.052	.049			.004	.001	.001			
85	71.35	12.80	0.80	0.36	0.13	0.68	2.26	3.54	6.54	1.87	none	0.03	0.04	SO ₂ none Cr ₂ O ₃ none V ₂ O ₅ none BaO, SrO, no. Li ₂ O none	100.40	2.282
A1. I	1.189	.126	.005	.005	.003	.013	.036	.037			—	—	—			
86	77.15	13.45	0.40	1.26	0.72	1.22	2.72	3.26	0.30	0.08		0.10	0.32		100.88	
A2. II	1.286	.131	.003	.018	.018	.021	.044	.035				.001	.005			
87	74.28	11.27	1.93	0.58	0.44	1.15	2.74	4.77	1.01	0.70	0.25	0.07	0.02		99.21	2.37
B2. III	1.238	.111	.011	.008	.011	.020	.044	.051			.003	—	—			
88	71.50	14.13	0.60	3.23	1.17	2.70	2.97	2.86	0.32	0.10	0.41	0.35	trace		100.34	2.59
A2. II	1.192	.138	.004	.044	.029	.048	.048	.031			.005	.002	—			
89	71.65	14.56	1.13	1.56	0.84	1.27	2.76	4.14	0.15	1.20	0.35	0.12	0.04	CO ₂ none Cl trace NiO none Li ₂ O trace	99.77	2.630
A1. I	1.194	.143	.007	.022	.021	.023	.045	.044			.004	.001	—			
90	78.98	13.02	0.17	0.18	0.18	0.90	2.63	3.23	0.40	none	0.08	0.09	0.02	CO ₂ 0.17 Cl 0.03 FeS ₂ 0.10	100.18	
A1. I	1.316	.127	.001	.003	.005	.016	.042	.034			.001	—	—			
91	72.22	14.35	1.22	1.69	0.30	1.22	2.50	5.12	0.68	0.12	0.42	0.07	0.02	CO ₂ 0.22 Cl 0.02 FeS ₂ 0.06	100.23	
A1. I	1.204	.141	.008	.024	.008	.021	.040	.054			.006	—	—			
92	71.88	13.75	2.32	0.61	0.21	1.25	3.02	3.91	1.43	0.73	0.18	0.25	0.02	CO ₂ none	99.56	
A2. II	1.198	.135	.014	.008	.005	.022	.048	.041			.002	.002				
93	70.80	14.44	1.76	1.44	0.20	2.30	2.89	3.45	2.37				0.43	CO ₂ 0.38	100.46	2.015
A3. III	1.180	.142	.011	.020	.005	.041	.047	.037					.006			
94	76.25	14.06	0.48	0.58	0.18	1.75	3.12	2.97	0.53	0.12	0.12	none	0.02	CO ₂ none SO ₂ 0.15	100.33	
A2. II	1.271	.138	.003	.008	.005	.031	.050	.032			.002	—	—			
95	73.76	12.96	2.20	0.36	0.75	1.42	2.06	4.50	2.00		0.14		none	CO ₂ none	100.15	
A2. II	1.229	.127	.014	.005	.019	.025	.033	.048			.002		—			
96	72.30	12.50	2.12	0.47	0.10	1.35	3.25	3.58	3.54	0.46	0.12	0.31	0.03		100.13	
A2. II	1.205	.123	.013	.007	.003	.024	.053	.038			.002	.002	—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBBRANG 3. SODIPOTASSIC. TEHAMOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
83	I.3.(1)2.3.	Q 45.42 hy 1.56 or 21.68 mt 1.16 ab 23.58 an 3.61 C 2.24	Wai Polang, Leitimor, Ambon Island, Moluccas.	D. Funk.	R. D. M. Verbeek, Jb. Mijnw., XXXIV, p. 230, 1905.	Ambonite (liparite).	
84	I.3(4).(1)2.3.	Q 36.18 hy 2.49 or 27.24 mt 0.70 ab 27.25 il 0.61 an 4.45 ap 0.34 C 0.51	Bolivia, New England, New South Wales.	J. C. H. Min- gaye.	E. C. Andrews, Rec. G. S. N. S. W., VIII, (3), p. 220, 1907.	Granite.	
85	I.3.(1)2.3.	Q 43.32 hy 0.30 or 20.57 mt 1.16 ab 18.86 an 3.61 C 4.08	Buladelah, New South Wales.	White and Greig.	A. R. Dept. Min. N. S. W. (1903), p. 143, 1904.	Rhyolite glass.	
86	I.3''2.3.	Q 44.28 hy 4.44 or 19.46 mt 0.70 ab 23.06 ap 0.34 an 5.00 C 3.47	Stanthorpe, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1912.	Granite.	H. C. Richards, pers. com.
87	I.3(4).(1)2.3.	Q 37.26 di 0.86 or 28.36 hy 0.70 ab 23.06 mt 1.16 an 4.45 il 0.46 hm 0.96	Chinghee Creek, Queensland.	A. T. Jefferis.	A. R. Agric. Chem. Qld., 1913.	Rhyolite.	H. C. Richards, pers. com.
88	I(II).3(4).2''. .3(4).	Q 34.32 hy 3.52 or 16.24 mt 0.93 ab 25.15 il 0.76 an 11.40 ap 0.67 C 1.84	Enoggera, n. Brisbane, Queensland.	N. H. Christ- ensen.	A. R. Agric. Chem. Qld., 1914.	Granite.	H. C. Richards, pers. com.
89	I.3(4).2.3.	Q 35.28 hy 3.65 or 24.46 mt 1.62 ab 23.58 il 0.61 an 5.56 ap 0.34 C 3.47	Barringo Creek, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 20, 1912.	Granodiorite porphyry.	
90	I.3.''2.3.	Q 49.32 hy 0.63 or 18.90 mt 0.23 ab 22.01 il 0.15 an 4.45 C 3.57	Thompsons Well, South Australia.	W. S. Chapman.	R. L. Jack, G. S. So. Austr., B. 1, p. 12, 1912.	Granite.	
91	I.3(4).''2.''3.	Q 34.80 hy 2.12 or 30.02 mt 1.86 ab 20.96 il 0.91 an 5.84 C 2.65	Paney Bluff, South Australia.	W. S. Chapman.	R. L. Jack, G. S. So. Austr., B. 1, p. 15, 1912.	Feldspar porphyry.	
92	I.3''.(1)2.3.	Q 37.74 hy 0.50 or 22.80 mt 1.39 ab 25.15 il 0.30 an 4.17 hm 1.28 C 3.16 ap 0.67	Gibraltar Rocks, Te Puke District, New Zealand.	Not stated.	J. A. Bartrum, Mines Statement N. Z., 1913, p. 139.	Rhyolite.	
93	I.3(4).2.3.	Q 34.38 hy 2.48 or 20.57 mt 2.55 ab 24.63 an 11.40 C 1.73	Putaruru, New Zealand.	J. S. MacLaurin.	J. S. MacLaurin, N. Z. A. R. Dom. Lab., 1908, p. 24.	Rhyolite.	Sp. gr. low?
94	I.3.2.3(4).	Q 42.54 hy 0.90 or 17.79 mt 0.70 ab 26.20 il 0.30 an 8.62 C 2.55	Mabel Bay, Brighton, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Pegmatite.	
95	I.3.2.''3.	Q 40.44 hy 1.90 or 26.69 mt 0.70 ab 17.29 il 0.30 an 6.95 hm 1.76 C 2.14	Puketui, Tairua, Hauraki, New Zealand.	Surv. lab.	Bell and Fraser, N. Z. G. S. B. 15, p. 48, 1912.	Rhyolite.	
96	I.3''.''2.3''.	Q 37.32 hy 0.30 or 21.13 mt 1.16 ab 27.77 il 0.30 an 4.73 hm 1.28 C 1.53 ap 0.67	Tieri Creek, Aroha, Hauraki, New Zealand.	Surv. lab.	Henderson and Bartrum, N. Z. G. S. B. 16, p. 73, 1913.	Wilsonite (rhyolite).	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. ALSBACHASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	73.09	13.42	1.44	1.13	0.35	1.89	4.52	1.59	1.41	0.47	0.26	0.05	0.10		99.72	
A2. II	1.218	.131	.009	.015	.009	.034	.073	.017			.003	—	.001			
2	74.97	10.39	1.56	1.47	1.18	1.83	3.68	2.34	0.92	0.59	0.70	0.14	0.07	CO ₂ 0.11	99.97	
A2. II	1.250	.102	.010	.021	.030	.032	.060	.025			.009	.001	.001	BaO 0.02		
3	76.89	11.47	1.77	0.87	0.36	1.63	4.42	2.50	0.16	none	0.11		0.05	S none	100.23	
A2. II	1.282	.112	.011	.012	.009	.029	.071	.027			.001		—			
4	69.54	17.95	2.50	0.22	0.50	1.80	4.30	1.21	1.96		none	none	none	SO ₃ 0.37	100.35	
A2. II	1.159	.176	.015	.003	.013	.032	.069	.013			—	—	—			
5	74.84	14.05	0.17	0.31	trace	1.57	3.66	3.14	2.33						100.07	2.38
A3. III	1.247	.138	.001	.004	—	.029	.059	.033								
6	76.91	12.18	0.48	0.92	none	0.92	4.17	3.15	0.66	0.24	0.18	none		S none	99.81	
A2. II	1.282	.120	.003	.013	—	.016	.068	.034			.002	—				
7	79.49	11.60	0.32	0.49	0.09	1.64	4.04	1.52	0.68				none		99.88	
A4. III	1.325	.114	.002	.007	.002	.029	.065	.016								
8	76.68	14.49	n d	1.09	0.84	1.53	3.92	1.20	0.36				trace		100.11	
A4. IV	1.278	.142	—	.015	.021	.027	.063	.013								
9	75.25	14.60	0.54	1.60	0.51	1.06	4.28	1.72	n. d.		0.06				99.62	
A3. III	1.258	.143	.003	.022	.013	.019	.069	.018			.001					
10	73.25	15.70	0.25	1.90	0.51	0.92	3.38	1.94	2.25		0.14				100.24	
A2. II	1.221	.154	.002	.026	.013	.016	.055	.021			.002					
11	75.88	14.75	trace	trace	0.16	2.08	3.78	2.60	0.20		0.50	trace	0.04	CO ₂ S none trace	99.99	
A2. II	1.266	.145	—	—	.004	.038	.061	.027			.006	—	—			
12	72.49	15.82	1.18	0.15	0.76	2.02	4.03	2.26	0.35		0.56	0.01	0.05	CO ₂ S 0.14 none	99.82	
A2. II	1.208	.155	.007	.002	.019	.036	.064	.024			.007	—	—			
13	75.87	13.09	n d	1.80	0.35	0.87	4.21	2.83	0.41	0.19	trace	trace			99.62	
A4. IV	1.265	.128	—	.025	.009	.016	.068	.030								
14	75.01	12.27	0.80	2.78	0.08	1.87	3.36	2.80	0.25	0.13	0.33	0.02	0.06	CO ₂ ZrO ₂ SO ₃ Cl F S Cr ₂ O ₃ V ₂ O ₅ NiO BaO MoO ₂ none none 0.07 0.13 none 0.02 none none none none	99.98	2.387
A1. I	1.250	.120	.005	.039	.002	.033	.054	.030			.004	—	.001			
15	73.32	12.25	2.77	2.20	0.11	1.65	3.92	2.34	0.35	.035	0.51	0.10	0.12	CO ₂ S NiO BaO 0.06 none none 0.09	100.14	
A1. I	1.222	.120	.018	.031	.003	.030	.063	.024			.006	.001	.002			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 4. DOSODIC. ALSBACHOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I.3(4).2.4.	Q 35.88 hy 1.30 or 9.45 mt 2.09 ab 38.25 il 0.46 an 9.45 C 0.71	Fallon Hill, Enfield, Massachusetts.	G. Steiger.	B. K. Emerson, U. S. G. S. B. 228, p. 40, 1904.	Aplite (alsbachite)	
2	I''3.''2.4.	Q 39.66 di 2.62 or 13.90 hy 2.16 ab 31.44 mt 2.32 an 4.73 il 1.37 ap 0.34	Marion Station, Jersey City, New Jersey.	W. T. Schaller.	J. V. Lewis, U. S. G. S. B. 419, p. 29, 1910.	Quartz- augite- orthoclase rock.	Igneous?
3	I.3''.(1)2.4.	Q 38.46 di 2.16 or 15.01 wo 0.58 ab 37.20 mt 2.55 an 3.89 il 0.15	Gold Hill District, Rowan County, North Carolina.	F. B. Laney.	F. B. Laney, N. C. G. S. B. 21, p. 54, 1910.	Granite.	
4	I.3(4).2.4''.	Q 35.40 hy 1.30 or 7.23 mt 0.70 ab 36.16 hm 1.92 an 8.90 C 6.32	Mount Holmes, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 65, 1899.	Dacite porphyry.	In W. T., p. 137.
5	I.3(4).2.(3)4.	Q 38.04 hy 0.40 or 18.35 mt 0.23 ab 30.92 an 8.06 C 1.73	East Mountain, Crested Butte District, Elk Mountains, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 148, p. 177, 1897.	Rhyolite.	In W. T., p. 137.
6	I.3(4).(1)2.''4.	Q 37.80 hy 1.06 or 18.90 mt 0.70 ab 35.63 il 0.30 an 4.45 C 0.20	Katmai Volcano, Alaska.	G. Steiger.	G. C. Martin, U. S. G. S. rec. lab.	Pumice.	
7	I.3.2.4.⊙	Q 46.44 hy 0.86 or 8.90 mt 0.46 ab 34.06 an 8.06 C 0.41	Cinder Cone, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 79, p. 29, 1891.	Pumice (inclosure in basalt).	In W. T., p. 137.
8	I.3.2.4''.	Q 43.92 hy 4.08 or 7.23 ab 33.01 an 7.51 C 3.98	Corinto, Nicaragua.	J. Petersen.	J. Petersen, N. J., 1898, II, p. 157.	Obsidian.	In W. T., p. 137.
9	I.3''2.4.	Q 39.78 hy 3.68 or 10.01 mt 0.70 ab 36.15 il 0.15 an 5.28 C 3.77	Riviere des Vieux Habitants, Guadeloupe, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 588, 1904.	Dacite obsidian.	
10	I.3.''2.4.	Q 41.88 hy 4.20 or 11.68 mt 0.46 ab 28.82 il 0.30 an 4.45 C 6.32	Riviere St. Thomas, Guadeloupe, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 588, 1904.	Dacite.	
11	I.3''2''4.	Q 39.42 hy 0.40 or 15.01 ru 0.50 ab 31.96 an 10.56 C 1.94	Average sample, Essequibo and Demerara rivers, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Brit. Guiana, p. 76, 1908.	Aplite.	In W. T., p. 137.
12	I.3(4).2.4.	Q 35.34 hy 1.90 or 13.34 il 0.30 ab 33.54 hm 1.12 an 10.01 ru 0.40 C 3.16	Average sample, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Brit. Guiana, p. 76, 1908.	Granitite.	In W. T., p. 137.
13	I.3(4).(1)2.4.	Q 36.66 hy 4.20 or 16.68 ab 35.63 an 4.45 C 1.43	Zanja Moroti, Paraguay.	M. Goldschlag.	M. Goldschlag, In. Diss. Jena, p. 13, 1913.	Aplite.	
14	I.3''2.(3)4.	Q 38.82 hy 4.29 or 16.68 mt 1.16 ab 28.30 il 0.61 an 9.17 C 0.31	Hraftinnuhryggur, n. Krafla, Iceland.	J. B. Ferguson.	F. E. Wright, B. G. S. A., XXVI, p. 260, 1915.	Obsidian.	
15	I''3''2.4.	Q 38.04 hy 1.49 or 13.34 mt 4.18 ab 33.01 il 0.91 an 7.51 ap 0.34 C 0.61	Beinn Bheag, Gruline, Mull Island, Scotland.	E. G. Radley.	G. S. Grt. Brit., Sum. Prog., (1912), p. 68, 1913.	Granophyre.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. ALSBACHASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16	72.63	13.49	2.17	1.04	0.89	1.65	3.86	2.62	0.31	0.23	0.07	0.26		SO ₂ 0.34	99.26	
B2. III	1.211	.132	.014	.014	.022	.030	.062	.028			.001	.002				
17	65.15	15.03	5.65	2.58	0.86	2.65	4.33	0.74	1.20	0.47	0.38	0.47		FeS ₂ 0.08	99.59	
A2. II	1.086	.147	.036	.036	.022	.047	.069	.008			.005	.003				
18	74.13	12.61	2.87	0.86	0.23	1.60	4.55	2.13	0.66				0.16		99.80	
A3. III	1.236	.123	.018	.012	.006	.029	.074	.022					.002			
19	77.35	13.16	0.73	0.78	0.99	1.09	2.67	2.35	1.40						100.52	
A3. III	1.289	.129	.004	.011	.025	.020	.043	.025								
20	75.7	13.1	1.0	1.1	0.7	1.4	2.9	2.2	1.6						99.7	
B3. IV	1.262	.128	.006	.015	.018	.025	.047	.023								
21	74.65	12.64	2.26	0.85	1.01	2.12	3.41	2.37	1.14						100.45	
A3. III	1.244	.124	.014	.012	.025	0.38	.055	.025								
22	72.89	15.83	1.89	0.10	1.31	2.04	2.81	2.29	1.21						100.37	
A3. III	1.215	.155	.012	.001	.033	.037	.045	.024								
23	76.03	13.34	2.14	1.39	0.57	0.90	3.71	2.62	0.12			0.14			100.96	
A3. III	1.267	.131	.013	.019	.014	.016	.060	.028				.002				
24	68.22	16.58	1.86	3.01	0.56	2.40	3.19	2.78	1.16		trace	0.42	trace	S trace	100.18	
A2. II	1.137	.163	.012	.042	.014	0.43	.062				—	.003				
25	75.13	14.61	0.32	0.54	0.63	1.43	3.77	2.95	0.16						99.54	
B3. IV	1.252	.143	.002	.008	.016	.025	.061	.032								
26	77.36	11.03	0.44	n. d.	2.54	2.20	3.58	1.52	1.27	0.93	0.11	trace		S trace	100.98	
B2. III	1.289	.108	.003	(.006)	.034	.039	.058	.016			.001	—				
27	73.97	12.88	1.39	n. d.	2.20	1.80	3.38	2.45	1.25	1.10	0.27	trace		S trace	100.69	
A3. III	1.233	.126	.009	(.018)	.055	.032	.055	.027			.003	—				
28	70.49	14.24	4.15	0.79	0.62	2.38	3.63	1.31	1.79		0.72		trace		100.12	
A2. II	1.175	.140	.026	.011	.016	.043	.058	.014			.009		—			
29	73.02	13.70	2.00	1.14	2.04	1.51	3.91	1.52	1.72	0.26	trace	0.14		CO ₂ trace	100.96	2.69
B2. III	1.217	.134	.013	.016	.051	.027	.063	.016			—	.001				
30	70.41	11.44	2.45	2.37	0.72	3.02	3.74	2.88	1.00	0.31	1.55	0.39			100.28	
A2. II	1.174	.112	.015	.033	.018	.054	.060	.030			.019	.003				
31	80.00	10.87	2.57	trace	0.79	1.05	2.51	2.05	n. d.			trace	trace		99.84	2.599
A7.4. IV	1.333	.107	.016	—	.020	.019	.040	.022				—	—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 4. DOSODIC. ALSBACHOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	I.3(4).2.4.	Q 36.06 hy 2.20 or 15.57 mt 3.25 ab 32.49 ap 0.67 an 6.67 C 1.84	Hermesbuckel, n. Aschaffenburg, Hessen.	Survey lab.	Chelius and Klemm, Erl. G. Kte. Hess., Bl. Schafheim, p. 19, 1894.	Granite.	In W. T., p. 137.
17	I(II).3(4).2'' 4(5).	Q 31.08 hy 2.20 or 4.45 mt 7.19 ab 36.15 il 0.76 an 10.29 hm 0.80 C 3.37 ap 1.01	Messel, Hesse.	K. M. Jene.	G. Klemm, Erl. G. Kte. Hess., Bl. Messel, p. 12 1910.	Malchite.	
18	I.3(4).2.4.	Q 35.88 di 0.43 or 12.23 hy 0.40 ab 38.78 mt 3.25 an 7.51 hm 0.64	Melibocus, Odenwald, Hesse Darmstadt.	F. Kutscher.	C. Chelius, Notbl. Vr. Erdk., (4), XIII, p. 8, 1892.	Alsbachite.	In W. T., p. 137.
19	I.3.2.(3)4.	Q 48.54 hy 3.42 or 13.90 mt 0.93 ab 22.53 an 5.56 C 4.18	Schnee-grube, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 189, 1899.	Graphic granite.	In W. T., p. 137.
20	I.3.2.''4.	Q 45.90 hy 2.99 or 12.79 mt 1.39 ab 24.63 an 6.95 C 3.37	Schwartzbrunn- kamm, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 172, 1902.	Granite.	
21	I.3''.2''.4.	Q 39.78 hy 2.50 or 13.90 mt 2.78 ab 28.82 hm 0.32 an 10.56 C 0.61	Arnsdorf, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 176, 1899.	Granite.	In W. T., p. 137.
22	I.3.2.(3)4.	Q 41.64 hy 3.30 or 13.34 mt 0.23 ab 23.58 hm 1.76 an 10.29 C 5.00	Schneekoppe, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 165, 1899.	Granitite.	In W. T., p. 137.
23	I.3.(1)2.''4.	Q 41.58 hy 2.19 or 15.57 mt 3.02 ab 31.44 ap 0.34 an 3.61 C 3.06	Seehaus, n. Wunsiedel, Fichtelgebirge.	H. Oberembt.	H. Oberembt, In. Diss. Erl., p. 38, 1905.	Granite gneiss.	
24	I''.3(4).2.(3)4.	Q 32.10 hy 5.36 or 15.68 mt 2.78 ab 27.25 ap 1.01 an 9.17 C 4.90	Königsfeld, Brünn, Moravia.	C. v. John.	v. John and Suess, Jb. G. R.-A. Wien, LVIII, (1), p. 249, 1908.	Granitite.	
25	I.3(4).2.''4.	Q 37.32 hy 2.39 or 17.79 mt 0.46 ab 31.96 an 6.95 C 2.55	Zenoviczstollen, Aranyida, Hungary.	B. Horvarth.	Emszt and Horvarth, Jb. Ung. G. R.-A., XIX, p. 286, 1912.	Granite.	
26	I''.3.2''.4.	Q 42.18 di 1.08 or 8.90 hy 6.56 ab 30.39 il 0.15 an 9.45	Cava d'Oggi, San Piero in Campo, Elba.	G. d'Achiardi.	G. d'Achiardi, Mem. A. d'Achiardi, p. 117, 1903.	Granite.	
27	I''.3''.2''.4.	Q 36.42 hy 7.48 or 15.01 il 0.46 ab 28.82 an 8.90 C 1.22	Cava d'Oggi, San Piero in Campo, Elba.	G. d'Achiardi.	G. d'Achiardi, Mem. A. d'Achiardi, p. 118, 1903.	Granite (dikelet).	
28	I''.3''.2(3).4.	Q 38.46 hy 1.60 or 7.78 mt 0.46 ab 30.39 il 1.37 an 11.95 hm 3.84 C 2.55	Monte Maiori, Putifigari, Sardinia.	F. Millosevitch.	F. Millosevitch, Mem. Ac. Linc., (5), VIII, No. 15, p. 611, 1911.	Dacite.	
29	I''.3.2.4.	Q 38.46 hy 5.50 or 8.90 mt 3.02 ab 33.01 ap 0.34 an 6.07 C 3.16	Kolascin, Montenegro.	E. Manasse.	E. Manasse, Proc. Verb. Soc. Tosc. Sc. Nat., XIII, p. 160, 1903.	Quartz diorite porphyry.	
30	I(II).3(4).2.''4.	Q 33.00 di 3.89 or 15.68 wt 0.46 ab 31.44 mt 3.25 an 6.12 il 2.89 hm 0.16 ap 1.01	Antsenavolo, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 19, 1913.	Rhyolite.	
31	I''.3.2.(3)4.	Q 54.18 hy 2.00 or 12.23 hm 2.57 ab 20.96 an 5.28 C 1.63	Balmoral, 50 miles east of Pretoria, Transvaal.	H. Eckstein & Co.	C. B. Horwood, Tr. G. Soc. S. Afr., XIII, p. 47, 1911.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. ALSBACHASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
32	78.61	7.76	4.51	1.69	0.90	2.60	2.10	1.74							99.91	2.712
A ² .3. III	1.310	.076	.028	.024	.023	.046	.034									
33	76.06	14.94	0.07	0.33	1.12	1.84	4.70	1.02	0.32	0.10	0.06	trace			100.56	
A3. III	1.268	.146	—	.005	.028	.033	.076	.011			—					
34	72.48	12.93	2.30	n. d.	0.26	0.88	3.71	2.23	5.12						99.91	2.28
A4. IV	1.208	.127	.014	(.028)	.007	.016	.060	.023								
35	70.74	15.21	2.35	0.04	0.72	1.64	3.06	2.54	3.16				trace		99.46	2.59
B3. IV	1.179	.149	.015	—	.018	.029	.049	.027								
36	69.36	15.56	0.50	1.71	1.31	2.77	3.28	2.34	1.06	0.14	1.00	0.57	0.18	FeS ₂ 0.21	99.99	2.71
A2. II	1.156	.152	.003	.024	.033	.050	.053	.025			.013	—	.003			
37	72.74	15.64	1.82	0.18	0.55	1.86	3.87	2.61	0.44				trace		99.71	2.5
A3. III	1.212	.153	.011	.003	.014	.033	.063	.028								
38	74.60	13.87	0.15	1.55	0.34	2.25	3.14	2.51	0.73	0.12	0.21	0.41	0.72	ZrO ₂ 0.06 S 0.06	100.72	2.640
A1. I	1.243	.136	.001	.022	.009	.040	.051	.027			.003	.003	.010			
39	73.03	12.97	0.65	0.79	0.53	0.98	3.79	3.38	3.49		0.05	trace	0.13	S 0.04	99.83	
A2. II	1.217	.127	.004	.011	.013	.018	.061	.036			.001	—	.002			
40	70.91	14.36	0.40	2.54	0.28	2.60	3.30	2.59	0.89	0.25	0.36	0.32	0.32	ZrO ₂ 0.02 S 0.29	99.43	
B1. II	1.182	.141	.003	.035	.007	.046	.053	.028			.005	.002	.005			
41	72.68	15.99	0.65	0.21	0.41	1.66	3.26	2.19	1.38	1.18	0.09	none	0.16	ZrO ₂ none Cl 0.02 F 0.01 S 0.05 Cr ₂ O ₃ none BaO 0.02 SrO 0.03	99.79	
A1. I	1.211	.157	.004	.003	.010	.030	0.53	.023			.001	—	.002			
42	70.62	11.54	1.20	0.18	0.26	1.72	3.52	1.45	7.24	2.42	0.04	0.08	0.01	CO ₂ 0.02 SO ₂ trace Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.05 SrO trace Li ₂ O none	100.35	2.262
A1. I	1.177	.113	.008	.003	.007	.030	.056	.016			—	—	—			
43	77.08	11.59	0.20	1.44	0.64	0.84	4.63	1.57	1.04	0.24	0.35	0.01	0.13	CO ₂ 0.48 ZrO ₂ 0.02 SO ₂ none Cl none FeS ₂ 0.05 Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.74 SrO trace Li ₂ O none	100.35	2.633
A1. I	1.265	.114	.001	.020	.016	.015	.074	.017			.004	—	.002			
44	75.73	12.70	2.25	n. d.	0.60	2.00	3.48	2.04	1.20						100.00	
A4. IV	1.262	.124	.014	(.028)	.015	.036	.056	.021								
45	73.08	13.50	2.60	0.13	0.15	1.07	3.95	3.19	1.33		0.62	trace	trace	SO ₂ 0.12 BaO 0.06	99.80	2.514
A2. II	1.218	.132	.016	.002	.004	.020	.064	.034			.008					

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 4. DOSODIC. ALSBACHOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
32	I(II).(2)3.2''4.	Q 53.70 di 4.85 or 10.01 mt 5.57 ab 17.82 hm 0.64 an 6.67	Orange Grove, Transvaal.	H. Eckstein & Co.	Horwood and Wade, Geol. Mag., (V), VI, p. 551, 1909.	Granite.	
33	I.3''2.4(5).	Q 38.82 hy 3.46 or 6.12 ab 39.82 an 9.17 C 2.65	Anabar River, Northern Siberia.	H. Backlund.	H. Backlund, Trav. Mus. G. St. Pet., I, p. 128, 1907.	Granite.	
34	I.3.''2.4.	Q 38.58 hy 4.40 or 12.79 ab 31.44 an 4.45 C 2.86	Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 57, 1904.	Marekanite.	
35	I.3.2.(3)4.	Q 38.82 hy 1.80 or 15.01 mt 0.23 ab 25.68 hm 2.24 an 8.06 C 4.49	Kivangra River, n. Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marck., p. 55, 1904.	Felsite porphyry.	
36	I''3(4).2''4''.	Q 34.20 hy 4.75 or 13.90 mt 0.70 ab 27.77 il 1.98 an 10.29 ap 1.34 C 3.77	Zeia River, Amur District, Siberia.	P. Todakis.	E. Ahnert, Reg. Aurif. Sib., X, Tab. VII, 1910.	Granite.	$P_2O_5=Ca_2$ (PO_4) ₂ .
37	I.3(4).2.4.	Q 35.13 hy 1.40 or 15.57 mt 0.70 ab 33.01 hm 1.28 an 9.17 C 2.96	Wilnischik, Kamchatka.	Not stated.	K. E. Bogdanovitch, Pet. Mitth., LII, p. 196, 1906.	Dacite.	
38	I''3.2.(3)4.	Q 40.68 hy 4.64 or 15.01 mt 0.23 ab 26.72 il 0.46 an 8.34 ap 1.01 C 2.86	Kukuda, Shodoshima, Sanuki, Japan.	N. Yoshioka.	S. Kozu, pers. com.	Granite.	
39	I.3(4).''2.(3)4.	Q 34.68 hy 2.36 or 20.02 mt 0.93 ab 31.96 il 0.15 an 5.00 C 1.22	Shimoda, Izu, Japan.	T. Ohashi.	S. Kozu, pers. com.	Rhyolite.	
40	I''3(4).2''(3)4.	Q 34.74 hy 4.92 or 15.57 mt 0.70 ab 27.77 il 0.76 an 10.84 ap 0.67 C 2.14	Shirai, Makabe, Hitachi, Japan.	T. Ohashi.	S. Kozu, pers. com.	Granite.	
41	I.3.2.4.⊙	Q 41.10 hy 1.00 or 12.79 mt 0.93 ab 27.77 il 0.15 an 8.34 C 5.20	Corregidor Island, Manila Harbor, Luzon, Philippine Islands.	E. W. Morley.	J. P. Iddings, pers. com.	Dacite.	
42	I.3.2.4.⊙	Q 40.68 hy 0.70 or 8.90 mt 0.70 ab 29.34 hm 0.80 an 8.34 C 1.12	Gloucester Buckets, New South Wales.	Not stated.	A. R. Dep. Min. N. S. W. (1908), p. 184, 1909.	Rhyolite glass.	
43	I''3''.(1)2.4''.	Q 39.36 hy 6.43 or 9.45 mt 0.23 ab 38.77 il 0.61 an 4.17 C 0.82	Gemeroo, New South Wales.	J. C. H. Min- gaye.	G. W. Card, pers. com.	Quartz keratophyre.	
44	I.3.2''4.	Q 41.10 hy 5.20 or 11.68 ab 23.34 an 10.01 C 1.12	Mount Read, Tasmania.	W. F. Ward.	Twelvetrees and Petterd, Proc. R. Soc. Tasm., (1898-9), p. 46, 1900.	Quartz keratophyre.	Not in W. T.
45	I.3(4).''2.(3)4.	Q 35.16 hy 0.40 or 18.90 il 0.30 ab 33.54 hm 2.60 an 5.56 ru 0.48 C 1.43	Waihi, Hauraki, New Zealand.	P. Holland.	P. Holland. Q. J. G. S., LV, p. 467, 1899.	Rhyolite.	In W. T., p. 137.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. ALSBACHASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	74.79	12.59	1.19	n. d.	0.31	3.58	5.10	0.21	1.03	0.09	0.17	trace	trace	CO ₂ 0.58 BaO none SrO none Li ₂ O none	99.64	
A2. II	1.247	.123	.007	(.014)	.008	.064	.082	.002								
2	76.52	12.08	0.92	0.93	none	1.21	6.19	none	0.62	0.34	0.18	0.06	0.03	CO ₂ 0.46 ZrO ₂ none S 0.57	100.11	
A1. I	1.275	.118	.006	.013	—	.021	.100	—			.002	—	—			
3	72.77	13.00	1.28	2.65	0.67	2.47	4.95	0.34	1.16	0.07	0.22	0.04	0.08	CO ₂ 0.47 BaO trace SrO trace Li ₂ O trace	100.17	
A1. I	1.213	.127	.008	.037	.017	.045	.080	.003								
4	77.58	13.96	0.54	0.45	0.30	0.83	4.97	0.90	0.20		0.40	trace	none	CO ₂ none	100.13	
A2. II	1.293	.137	.003	.006	.008	.014	.080	0.10			.005	—	—			
5	71.80	15.60	n. d.	2.25	1.66	1.16	4.80	0.60	1.60		0.07	0.06			99.60	
A3. III	1.197	.153	—	.031	.042	.042	.077	.007			.001	—				
6	76.67	14.20	0.14	n. d.	0.04	2.67	5.33	0.52	0.48						100.04	2.64
A3. III	1.278	.139	.001	(.002)	.001	.048	.085	.005								
7	75.80	12.65	1.87	1.16	0.43	2.11	4.83	0.42	0.24	0.02	0.21	0.19		CO ₂ 0.01 SO ₃ 0.17	100.11	
A2. II	1.263	.124	.012	.016	.011	.038	.077	.004			.003	.001				
8	75.61	12.62	1.10	1.00	0.98	2.18	5.10	0.68	0.38	0.04	0.35	0.32			100.36	2.67
A2. II	1.260	.124	.007	.014	.025	.039	.082	.007								
9	80.66	10.91	—	—	0.44	2.22	4.24	0.66	0.35						99.48	
A? 4. IV	1.344	.107	—	—	.011	.039	.068	.007								
10	76.01	13.89	0.20	0.70	0.39	2.03	5.32	0.32	0.72	0.14	0.09	none	0.13	ZrO ₂ none Cl 0.08 F 0.05 S 0.09 Cr ₂ O ₃ none BaO 0.05 SrO 0.06	100.27	
A1. I	1.267	.136	.001	.010	.010	.036	.085	.003			.001	—	.002			
11	70.27	16.11	0.97	1.22	1.87	1.76	4.64	0.64	1.08	0.10	0.12	0.12	0.20	CO ₂ 0.20 FeS ₂ 0.09	99.39	2.70
B2. III	1.171	.158	.006	.017	.047	.031	.075	.007			.003	.001	.003			

RANG 3. ALKALICALIC. RIESENASE. (C. I. P. W., 1902.)

1	70.91	16.18	0.51	1.09	0.37	2.92	1.33	5.53	0.12	0.13	0.20	0.11	0.04	BaO 0.10	99.44	2.654
A2. II	1.182	.159	.003	.015	.009	.052	.021	.059			.003	.001	—			
2	70.20	15.48	0.86	1.07	0.93	2.36	1.24	4.38	1.80		trace	trace	trace	S 0.03 ZnO 2.14	100.49	2.662
A2. II	1.170	.152	.005	.015	.023	.042	.020	.046			—	—	—			15°

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 5. PERSODIC. YUKONOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I 3(4).2''5.	Q 37.20 di 4.70 or 1.11 wo 0.58 ab 42.97 il 0.30 an 10.84	Near Fort Hamlin, Yukon River, Alaska.	H. N. Stokes.	J. E. Spurr, U. S. G. S. B. 168, p. 229, 1900.	Tonalite- aplite (yukonite).	Named yukon- ite in U. S. G. S. B. 228, p. 270, 1904. In W. T., p. 139.
2	I.3(4).(1)2.5.	Q 37.88 di 0.75 ab 52.40 hy 0.26 an 5.00 mt 1.39 il 0.30	Afterthought Dis- trict, Shasta County, Cali- fornia.	G. Steiger.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Granite porphyry.	
3	I''3(4).2(3).5.	Q 34.86 hy 5.26 or 1.67 mt 1.86 ab 41.92 il 0.46 an 12.51	Greenville, Plumas County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. B. 148, p. 201, 1897.	Quartz porphyry.	In W. T., p. 139.
4	I.3.(1)2.(4)5.	Q 43.02 hy 0.80 or 5.56 mt 0.23 ab 41.92 il 0.76 an 3.89 hm 0.32 C 3.37	Towakaima Falls, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., II, p. 10, 1898.	Aplite.	In W. T., p. 139.
5	I''3''2''5.	Q 34.62 hy 8.16 or 3.89 il 0.15 ab 40.35 an 5.84 C 4.90	Deux Evailles, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 41, 1913.	Microgranite.	
6	I.3(4).2(3).5.	Q 38.34 hy 0.36 or 2.78 ab 44.54 an 13.34 C 0.10	Ytterby, Sweden.	A. Bygden,	A. Bygden, B. G. Inst. Ups., VII, p. 8 (1905), 1906.	Oligoclase graphic granite.	
7	I.3.2.5.☉	Q 41.70 hy 1.23 or 2.22 mt 2.78 ab 40.35 il 0.46 an 9.73 ap 0.34 C 0.82	Darmstadt, Hessen.	Stadler.	G. Klemm, Erl. G. Kte. Hess., Bl. Rossdorf, p. 43, 1912.	Granite.	
8	I.3''2''5.	Q 38.04 hy 2.90 or 3.89 mt 1.62 ab 42.97 il 0.61 an 3.90 ap 0.67 C 0.31	Ruseinschlucht, Ponteglia Gebiet, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Alsbachite.	
9	I.3.2.(4)5.	Q 48.72 di 1.51 or 3.89 hy 0.40 ab 35.63 an 8.90	Tumagorkaja, Caucasus.	D. Beljankin.	F. Loewinson-Lessing, Vh. Russ. Min. Ges., XLII, p. 280, 1905.	Greisen.	
10	I.3''2.5.	Q 38.82 hy 2.32 or 1.67 mt 0.23 ab 44.54 il 0.15 an 10.01 C 1.22	Timor Island, Moluccas.	E. W. Morley.	J. P. Iddings, pers. com.	Not named.	
11	I''3(4).2''5.	Q 33.84 hy 6.28 or 3.89 mt 1.39 ab 39.30 il 0.30 an 7.78 ap 0.34 C 4.90	Ravensthorpe, Phillips River District, West Australia.	E. S. Simpson.	Simpson and Glanert, W. Aust. G. S. B. 35, p. 21, 1909.	Granite.	

SUBRANG 2. DOPOTASSIC.

1	I.3(4).(2)3.2.	Q 35.16 hy 2.09 or 32.80 mt 0.70 ab 11.00 il 0.46 an 13.62 ap 0.34 C 3.06	Rommel Laccolith, Okanagan Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38, (1), p. 446, 1912.	Biotite granite.	Metamorphosed. Cf. No. 29, I.4.3.4.
2	I.3.(2)3.2.	Q 39.42 hy 3.62 or 25.58 mt 1.16 ab 10.48 an 11.68 C 4.49	Kamaresa, n. Laurion, Attica, Greece.	R. Lepsius.	R. Lepsius, G. von Attika, p. 93, 1893.	Granite.	Dike. ZnO high. In W. T., p. 139.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. RIESENASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	66.39	18.16	2.50	1.13	0.85	3.71	1.96	3.56	0.56	0.66	0.50	0.06	0.06	CO ₂ none ZrO 0.03 S 0.03 BaO 0.07 SrO 0.02	100.55	
A1. I	1.107	.178	.016	.016	.021	.066	.032	.038			.006	.003	—			
2	65.67	13.48	1.51	n. d.	0.31	2.41	1.52	2.42	12.27			trace	trace	SO ₂ 0.28 BaO 0.32	100.19	
A3. III	1.095	.132	.009	(.018)	.008	.043	.024	.025				—	—			
3	72.42	10.47	0.83	5.50	0.41	2.53	1.93	2.94	1.11	0.06	0.68	0.11	0.16	CO ₂ 0.61	99.76	2.784
A2. II	1.207	.103	.005	.076	.010	.045	.031	.031			.009	.001	.002			
4	71.25	18.03	1.29	0.34	0.38	2.61	2.25	3.09	0.82			0.13	trace		100.19	
A3. III	1.187	.176	.008	.005	.010	.046	.036	.033				.001	—			
5	74.13	14.09	2.27	0.30	0.58	2.95	3.08	2.99	0.11						100.50	
A3. III	1.236	.138	.014	.004	.015	.053	.050	.032								
6	76.82	13.68	1.75	0.32	0.51	2.83	1.55	2.10	0.74						100.30	
A3. III	1.280	.134	.011	.004	.013	.050	.025	.022								
7	76.4	10.8	1.4	1.0	1.9	2.4	1.9	2.7	1.3						99.8	
B3. IV	1.273	.106	.009	.014	.048	.043	.031	.029								
8	75.6	12.2	2.2	1.4	1.4	2.7	1.3	2.8	1.0						100.6	
B3. IV	1.260	.120	.014	.019	.035	.048	.021	.030								
9	75.27	13.98	1.90	1.00	1.44	2.16	1.54	2.01	0.91						100.21	
A3. III	1.255	.136	.012	.014	.036	.039	.025	.021								
10	75.21	14.18	0.75	1.05	0.44	2.40	1.74	3.12	1.01						99.90	
A3. III	1.254	.139	.005	.015	.011	.043	.028	.033								
11	74.5	12.2	3.1	1.3	1.6	3.2	1.3	1.9	1.1						100.2	
B3. IV	1.242	.120	.019	.018	.040	.057	.021	.020								
12	72.92	17.77	0.20	1.09	0.79	2.17	1.24	2.65	1.35						100.18	
A3. III	1.215	.174	.001	.015	.020	.039	.020	.028								
13	72.71	14.59	1.78	0.92	2.17	2.57	1.65	1.99	1.67						100.05	
A3. III	1.212	.143	.011	.012	.054	.047	.027	.021								
14	72.5	17.2	1.0	0.6	1.2	2.9	1.6	2.1	1.0						100.1	
B3. IV	1.208	.169	.006	.008	.030	.052	.026	.022								
15	72.11	16.74	0.89	1.28	1.04	2.24	1.20	2.88	1.75						100.13	
A3. III	1.202	.164	.006	.018	.026	.040	.019	.030								
16	69.04	16.91	2.22	1.36	1.86	3.16	1.76	2.44	1.01						99.76	
A3. III	1.151	.166	.014	.019	.047	.056	.028	.025								

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBBRANG 3. SODIPOTASSIC. RIESENOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I''3(4).3.3.	Q 33.48 hy 2.10 or 21.13 mt 2.32 ab 16.77 il 0.91 an 15.57 hm 0.96 C 5.30 ap 1.01	Texas Creek, San Cristobal, quadrangle, Colorado.	W. T. Schaller.	W. Cross, U. S. G. S. rec. lab.	Quartz latite.	
2	I.3.3.3.⊙	Q 41.34 hy 3.18 or 13.90 ab 12.57 an 11.95 C 4.08	Silver Cliff, Custer County, Colorado.	L. G. Eakins.	Cross and Eakins, A. J. S., XLIV, p. 101, 1892.	Pitchstone.	In W. T., p. 139.
3	I(II).3.(2)3.3.	Q 40.86 hy 9.18 or 17.24 mt 1.16 ab 16.24 il 1.37 an 11.40 ap 0.34	Moyie Sill, Purcell Mountains, British Columbia.	M. Dittrich.	R. A. Daly, Rosenb. Fests., p. 214, 1906.	Granite.	Fresh?
4	I.3.(2)3.3.	Q 40.68 hy 0.90 or 18.35 mt 1.16 ab 18.86 hm 0.48 an 11.95 ap 0.34 C 6.53	Abriachan, Loch Ness, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VIII, (1), p. 54, 1901.	Granite.	
5	I.3(4).(2)3.3(4).	Q 37.38 hy 1.50 or 17.79 mt 0.93 ab 26.20 hm 1.60 an 14.73 C 0.31	Punta Suariccione, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 35, 1906.	Granite.	
6	I.''3.3.3.	Q 53.10 hy 1.30 or 12.23 mt 0.93 ab 13.10 hm 1.12 an 13.90 C 3.77	Schlüsselberg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 180, 1899.	Granite.	In W. T., p. 141.
7	I.''3.''3.3.	Q 46.44 hy 5.46 or 16.12 mt 2.09 ab 16.24 an 11.95 C 0.31	Schwarzbrunn, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 175, 1902.	Granite.	
8	I.''3.3.''3.	Q 49.08 hy 4.16 or 16.68 mt 3.25 ab 11.00 an 13.34 C 2.14	Landeshuterkamm, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 113, 1902.	Granite.	
9	I.''.''3.3.3.	Q 51.78 hy 3.87 or 11.68 mt 2.78 ab 13.10 an 10.84 C 5.20	Grünbusch, n. Hirschberg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 194, 1899.	Granite.	In W. T., p. 141.
10	I.3.''3.3.	Q 46.86 hy 2.42 or 18.35 mt 1.16 ab 14.67 an 11.25 C 3.57	Bolzenschloss Berg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 186, 1899.	Aplite.	In W. T., p. 141.
11	I.''.''3.3''3.	Q 50.52 hy 4.00 or 11.12 mt 4.18 ab 11.00 hm 0.16 an 15.85 C 2.24	Landeshuterkamm, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 176, 1902.	Granitite.	
12	I.''3.3.''3.	Q 48.90 hy 3.85 or 15.57 mt 0.23 ab 10.48 an 10.84 C 8.87	Schmiedeberg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 168, 1899.	Granitite.	In W. T., p. 141.
13	I.''3.3.3.	Q 46.56 hy 5.40 or 11.67 mt 2.55 ab 14.14 an 13.06 C 4.90	Grünbusch, n. Hirschberg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 169, 1899.	Granitite.	In W. T., p. 141.
14	I.3.3.3.⊙	Q 47.04 hy 3.26 or 12.23 mt 1.39 ab 13.62 an 14.46 C 7.04	Muchow, Isergebirge, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 167, 1902.	Granite.	
15	I.3.3.(2)3.	Q 47.40 hy 4.18 or 16.68 mt 1.39 ab 9.96 an 11.12 C 7.65	Bärndorfer Berg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 222, 1899.	Schliere in granite.	In W. T., p. 139.
16	I.''3.3.3.	Q 40.14 hy 5.36 or 13.90 mt 3.25 ab 14.67 an 15.57 C 5.51	Grünbusch, n. Hirschberg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 210, 1899.	Granodiorite.	In W. T., p. 141.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. RIESENASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
17	73.34	14.43	0.59	0.77	0.72	3.52	2.58	2.61	1.07		0.44	0.13	0.24	CO ₂ 0.04	100.48	2.669
A2. II	1.222	.142	.004	.011	.018	.063	.042	.028			.006	.001	.003			
18	71.62	12.81	1.64	1.76	1.08	3.14	2.73	3.02	1.93						99.73	
A3. III	1.194	.125	.010	.025	.027	.056	.044	.032								
19	75.9	10.5	1.8	1.9	1.7	3.4	1.7	2.2	1.2						100.3	
B3. IV	1.265	.103	.011	.026	.042	.061	.027	.023								
20	73.9	11.3	3.2	1.2	1.6	4.2	1.2	2.6	1.0						100.2	
B3. IV	1.232	.111	.020	.017	.040	.075	.019	.028								
21	71.4	14.5	2.4	1.4	1.1	2.7	2.4	3.1	0.9						99.9	
B3. IV	1.190	.142	.015	.019	.028	.048	.039	.033								
22	69.36	16.93	1.27	1.25	0.92	3.66	2.16	3.20	1.10		none	trace			99.85	2.680
A3. III	1.156	.166	.008	.017	.023	.065	.035	.034			—	—				
23	73.62	14.86	0.29	1.24	0.75	3.45	2.26	2.39	0.71	0.16	0.21	0.19	0.18	ZrO ₂ 0.08 S 0.06	100.45	2.652
A1. I	1.227	.146	.002	.017	.019	.062	.036	.026			.003	.001	.003			
24	72.75	14.39	0.41	2.43	1.21	2.95	2.11	2.08	0.13	0.37	0.42	0.51	0.18	ZrO ₂ 0.07 S 0.09	100.10	2.669
A1. I	1.213	.141	.003	.033	.030	.053	.034	.022			.005	.004	.003			
25	69.44	12.10	4.65	2.13	1.52	3.03	2.57	3.00	0.65	0.19	0.55	0.32			100.15	
A2. II	1.157	.119	.029	.029	.038	.054	.042	.032			.007	.002				
26	66.68	13.39	0.91	0.21	none	2.72	2.23	2.51	10.05		0.38			CO ₂ trace	99.08	
B2. III	1.111	.131	.006	.003		.048	.035	.027			.010					
27	76.25	11.30	0.35	3.88	1.48	2.60	1.23	1.82	0.32	0.02	0.65	none	0.06	CO ₂ none SO ₃ none Cl none Cr ₂ O ₃ none NiO 0.03 BaO none SrO none	99.99	2.398
A1. I	1.271	.111	.002	.054	.037	.046	.019	.019			.008		.001			
28	77.72	9.97	0.32	3.75	1.59	2.40	1.29	1.96	0.15	0.04	0.86	none	trace	CO ₂ none SO ₃ none Ca trace NiO none BaO none SrO none Li ₂ O trace	100.05	2.385
A1. I	1.294	.098	.002	.052	.040	.043	.021	.021			.011	—	—			

RANG 3. ALKALICALCIC. RIESENASE.

1	67.33	16.20	1.40	2.73	1.31	2.81	3.15	2.14	1.84		0.80	0.16	trace	BaO 0.05		99.92
A2. II	1.122	.159	.009	.038	.033	.050	.051	.022			.010	.001				
2	73.69	12.89	1.02	2.58	0.50	3.74	2.81	1.48	1.06						99.77	
A3. III	1.228	.126	.006	.036	.013	.067	.045	.016								

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBBRANG 3. SODIPOTASSIC. RIESENNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
17	I.3''.3.3(4).	Q 39.60 hy 2.33 or 15.57 mt 0.93 ab 22.01 il 0.91 an 16.68 ap 0.34 C 1.22	Appmansberg, Bayrischer Wald, Bavaria.	A. Schwager.	Oebbke and Schwager, Geogn. Jhft., XIV, p. 249, 1901.	Granite- diorite (aplitic).	
18	I''.3(4).(2)3.3''.	Q 35.46 di 1.57 or 17.79 hy 3.92 ab 23.06 mt 2.32 an 13.62	Steinwiesenthal, Schladminger Tauern, Styria.	J. A. Ippen.	J. A. Ippen, Mt. Nw. Ver. Steierm., p. 131, 1901.	Granite.	
19	I(II).3.3.3.	Q 47.64 di 1.79 or 12.79 hy 5.32 ab 14.15 mt 2.55 an 14.73	Roc Noir, Dent Blanche, Wallis, Switzerland.	Student of Herz.	L. Milch, N. J., 1901, I, p. 87.	Aplite.	
20	I(II).3.3''.(2)3.	Q 46.26 di 2.38 or 15.57 hy 2.90 ab 9.96 mt 3.94 an 17.79 il 0.46	Roc Noir, Dent Blanche, Wallis, Switzerland.	Student of Herz.	L. Milch, N. J., 1901, I, p. 69.	Granite gneiss.	
21	I''.3''.(2)3.3.	Q 37.80 hy 3.33 or 18.35 mt 3.48 ab 20.44 an 13.34 C 2.24	Roc Noir, Dent Blanche, Wallis, Switzerland.	Student of Herz.	L. Milch, N. J., 1901, I, p. 72.	Granite gneiss.	
22	I.3(4).3.3.	Q 34.80 hy 3.49 or 18.90 mt 1.86 ab 18.34 an 18.07 C 3.26	Plaka, n. Laurion, Attica, Greece.	R. Lepsius.	R. Lepsius, G. von Attika, p. 89, 1893.	Granite.	In W. T., p. 141.
23	I.3.3.3(4).	Q 42.18 hy 3.88 or 14.46 mt 0.46 ab 18.86 il 0.46 an 16.40 ap 0.34 C 2.55	Kitakijima, Bitchu, Japan.	N. Yoshioka.	S. Kozu, pers. com.	Granite.	
24	I(II).3''.3.3(4).	Q 43.62 hy 6.70 or 12.23 mt 0.70 ab 18.86 il 0.76 an 11.12 ap 1.34 C 4.39	Shiou, Honjyo, Bizen, Japan.	N. Yoshioka.	S. Kozu, pers. com.	Granite.	
25	I''.3''.(2)3.3''.	Q 36.78 di 0.43 or 17.79 hy 0.60 ab 22.01 mt 5.10 an 12.51 il 1.06 hm 1.12 ap 0.67	Brogo, New South Wales.	A. Pain.	W. N. Benson, pers. com.	Granite.	
26	I.3''.3.3.	Q 38.58 il 0.46 or 15.01 hm 0.91 ab 18.34 ru 0.56 an 13.34 C 2.14	Boggabri, Nandewar Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 904, 1908.	Pitchstone.	
27	I(II).(2)3.3.3.	Q 52.14 hy 9.64 or 10.56 mt 0.46 ab 9.96 il 1.22 an 12.79 C 2.75	Hamilton, Victoria.	G. Ampt.	H. E. Summers, Pr. R. Soc. Vict., XXI, (2), p. 425, 1909.	Obsidianite.	"Button." Igneous?
28	I(II).(2)3.3.3.	Q 52.62 hy 9.15 or 8.90 mt 0.46 ab 11.00 il 1.67 an 11.95 C 1.33	Peake Station, n. Lake Eyre, South Australia.	G. Ampt.	H. E. Summers, P. R. Soc. Vict., XXI, (2), p. 425, 1909.	Obsidianite.	"Button." Igneous?

SUBBRANG 4. DOSODIC. SUSQUEHANNOSE. (F. BASCOM, 1905.)

1	I(II).3(4).(2)3.4.	Q 32.28 hy 5.81 or 12.23 mt 2.09 ab 26.72 il 1.52 an 13.07 ap 0.34 C 3.98	East Clarendon, Vermont.	H. N. Stokes.	B. K. Emerson, U. S. G. S. B. 148, p. 71, 1897.	Granite.	In W. T., p. 185.
2	I''.3.3.4	Q 41.22 di 0.49 or 8.90 hy 5.00 ab 23.58 mt 1.39 an 18.07	Port Deposit, Cecil County, Maryland.	W. Bromwell.	G. P. Grimsley, J. Cinn. Soc. Nh., XVII, 1894.	Granite.	Cf. F. Bascom, Md. G. S. Rep. Cecil Co., p. 118, 1902. In W. T., p. 141.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. RIESENASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3	72.43	13.93	0.90	2.45	0.58	3.38	3.20	2.14	0.54	0.11	0.21	0.44	0.02	CO ₂ 0.09 S 0.01 BaO 0.01 SrO trace Li ₂ O trace	100.04	
A1. I	1.207	.136	.006	.034	.015	.061	.052	.023			.003	.003	—			
4	76.01	10.98	0.37	3.35	0.28	3.21	2.76	1.32	0.51	none	0.50	0.10	0.55	CO ₂ none S 0.31	100.25	
A2. II	1.267	.108	.002	.047	.007	.057	.045	.014			.006	.001	.008			
5	71.60	18.90	0.46	1.86	1.95	2.38	1.57	0.96	0.25		0.13				100.06	
A3. III	1.193	.185	.003	.026	.049	.043	.026	.010								
6	71.50	17.44	0.45	1.96	1.03	3.00	2.45	1.53	0.68		0.10	trace	trace	CO ₂ 0.42 S trace	100.56	2.705
A2. II	1.192	.171	.003	.028	.026	.053	.040	.016			.001	—	—			
7	76.13	12.44	0.74	n. d.	0.83	3.25	3.34	1.50	1.52						99.75	
A4. IV	1.269	.122	.005	(.010)	.021	.058	.054	.016								
8	72.81	15.22	1.88	1.40	1.10	2.77	2.10	1.54	1.66						100.48	
A3. III	1.214	.149	.012	.019	.027	.050	.034	.016								
9	70.55	13.27	3.72	0.82	0.32	3.58	3.66	1.28	1.65	0.28	trace				99.13	2.67
B3. IV	1.176	.130	.023	.011	.008	.064	.059	.014								
10	72.65	14.55	0.37	1.55	0.85	3.57	3.15	2.02	0.48	0.17	0.29	0.25	0.36	ZrO ₂ 0.07 S 0.07	100.40	2.633
A1. I	1.211	.143	.002	.022	.021	.064	.051	.021			.004	.002	.005			
11	69.10	16.32	3.70	1.37	1.12	5.10	2.91	1.06							100.68	2.456
A3. III	1.152	.160	.023	.019	.028	.091	.047	.012								

RANG 3. ALKALICALCIC. RIESENASE.

1	75.67	12.28	0.85	2.59	0.37	2.65	3.63	0.78	0.29	0.12	0.29	0.05	0.18	CO ₂ trace S 0.11 BaO 0.07	99.93	
A1. I	1.261	.120	.005	.036	.009	.047	.058	.008			.004	—	.003			
2	74.32	12.08	0.54	1.51	0.03	4.17	4.15	0.32	2.31	0.20	0.22			CO ₂ none	99.85	
A2. II	1.239	.118	.003	.021	.001	.075	.067	.003			.003					
3	72.24	13.84	1.45	1.86	1.10	3.40	4.43	0.39	0.69	0.17	0.41	0.10	0.12	BaO 0.08 SrO trace	100.28	
A2. II	1.204	.136	.009	.026	.028	.060	.071	.004			.005	.001	.002			
4	71.48	13.24	0.94	3.30	1.42	3.75	3.84	0.44	1.51	0.22	0.32	0.05	0.06	CO ₂ none	100.57	
A2. II	1.191	.130	.006	.046	.036	.067	.062	.005			.004	—	.001			
5	72.54	16.19	1.16	1.17	0.65	3.25	4.47	0.23	0.05		0.20	0.12	trace	CO ₂ none	100.03	
A2. II	1.209	.159	.007	.017	.016	.058	.072	.002			.003	.001	—			
6	76.94	12.60	0.68	1.14	0.23	3.50	4.23	0.25	0.36		0.10	trace	trace		100.03	
A2. II	1.282	.123	.004	.016	.006	.063	.068	.003			.001	—	—			

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 4. DOSODIC. SUSQUEHANNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	I''3''(2)3.4.	Q 36.90 hy 4.80 or 12.79 mt 1.39 ab 27.25 il 0.46 an 14.18 ap 1.01 C 1.02	Columbia, Virginia.	R. C. Wells.	S. Taber, Va. G. S. B. VII, p. 65, 1913.	Granite.	
4	I''3.3.4.	Q 45.36 di 1.21 or 7.78 hy 6.28 ab 23.58 mt 0.46 an 13.62 il 0.91 ap 0.34	Ducktown, Tennessee.	C. Palmer.	Laney, U. S. G. S. rec. lab.	Border of pseudo- diorite.	Igneous?
5	I''(2)3.3.4.	Q 49.26 hy 7.67 or 5.56 mt 0.70 ab 13.62 il 0.30 an 11.95 C 10.81	St. Vincent, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 599, 1904.	Cordierite dacite.	Bomb.
6	I''3.3.4.	Q 42.00 hy 5.77 or 8.90 mt 0.70 ab 20.96 il 0.15 an 14.73 C 6.32	Average sample, Potaro, etc., rivers, British Guiana.	Assistant of J. B. Harri- son.	J. B. Harrison, G. Goldf. Brit. Gui., p. 60, 1908.	Quartz porphyrite.	In W. T., p. 141.
7	I.3.''3.4.	Q 42.60 di 1.83 or 8.90 hy 2.52 ab 28.30 an 13.90	Bolzenschloss, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 184, 1899.	Aplite.	In W. T., p. 141.
8	I''3.3.''4.	Q 46.80 hy 3.62 or 8.90 mt 2.78 ab 17.52 an 13.90 C 5.00	Koppenkegel, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 152, 1899.	Granitite.	In W. T., p. 141.
9	I''3(4).3.4.	Q 36.48 di 1.73 or 7.78 mt 2.55 ab 30.92 hm 1.92 an 15.85	Plattspitzkar, n. Maul, Tyrol.	G. Hradil.	G. Hradil, Sb. Ak. W. Wien, CXXI, p. 876, 1912.	Tonalite porphyrite.	
10	I''3.''3.4.	Q 37.38 hy 4.87 or 11.68 mt 0.46 ab 26.72 il 0.61 an 15.35 ap 0.67 C 1.43	Kitakijima, Bitchu, Japan.	N. Yoshioka.	S. Kozu, pers. com.	Granite.	
11	I''3(4).3(4).4.	Q 35.28 hy 2.80 or 6.67 mt 4.41 ab 24.62 hm 0.64 an 25.29 C 1.02	Izu-San, Japan.	B. Koto.	B. Koto. Q. J. G. S., XL, p. 445, 1884.	Andesite.	In W. T., p. 141.

SUBRANG 5. PERSODIC.

1	I''3.''3(4)5.	Q 44.10 hy 4.46 or 4.45 mt 1.16 ab 30.39 il 0.61 an 13.07 C 0.92	Port Deposit, Cecil County, Maryland.	W. F. Hille- brand.	F. Bascom, Md. G. S., Rep. Cecil Co., p. 138, 1902.	Metarhyolite.	
2	I''3.''3.5.	Q 40.80 di 3.94 or 1.67 wt 1.28 ab 35.11 mt 0.70 an 13.34 il 0.46	Little Backbone Mountain, Shasta County, California.	R. C. Wells.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Granite.	
3	I''3(4)''3.5.	Q 35.52 hy 4.65 or 2.22 mt 2.09 ab 37.20 il 0.76 an 15.85 ap 0.34 C 0.41	Near Milton, Calaveras County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14, (II), p. 484, 1894.	Quartz porphyrite.	In W. T., p. 143.
4	I(II),3''3.''5.	Q 35.22 di 0.92 or 2.78 hy 7.89 ab 32.49 mt 1.39 an 17.51 il 0.61	Spring Creek, Shasta County, California.	G. Steiger.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Monzonite.	
5	I.3''''3.5.	Q 37.92 hy 2.52 or 1.11 mt 1.62 ab 37.73 il 0.46 an 15.29 ap 0.34 C 3.06	Towakaima Falls, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., Pt. II, p. 10, 1898.	Granite gneiss.	Also in G. Goldf. Br. Gui., p. 39, 1908. In W. T., p. 143.
6	I.3.''3.5.	Q 43.38 di 2.85 or 1.67 hy 0.60 ab 35.63 mt 0.93 an 14.46 il 0.15	Utsire Island, Haugesund, Norway.	Lab. Berg. Tech. Schule.	C. F. Kolderup, Berg. Mus. Aarb., 1911, No. 17, p. 14.	Granodiorite.	

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. RIESENASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	76.10	13.40	0.87	0.89	0.41	3.56	3.58	0.32	0.50			0.96	trace	S 0.33	100.92	
B2. III	1.268	.131	.005	.013	.010	.064	.058	.003				.007	—			
8	75.39	13.15	0.83	0.60	0.88	3.57	4.64	0.23	0.09		trace	0.18	0.02		99.79	2.63
A2. II	1.257	.129	.005	.008	.022	.064	.075	.002			—	.001	—			

RANG 4. DOCALCIC.

1	73.3	13.0	3.9	1.0	2.1	3.9	1.2	1.6	0.7						100.7	
B3. IV	1.222	.127	.024	.014	.053	.070	.019	.017								
2	73.59	12.35	0.38	3.79	1.80	3.76	1.03	1.93	0.53	0.27	0.70		0.15	ZrO ₂ 0.01 NiO none BaO trace SrO trace Li ₂ O trace	100.29	2.428
A1. I	1.227	.121	.002	.053	.045	.067	.016	.021			.009		.003			22°
3	73.76	12.96	2.20	0.36	0.75	1.42	2.06	4.50	2.00		0.14		none	CO ₂ none	100.15	
A2. II	1.229	.127	.014	.005	.019	.025	.033	.048			.002		—			

RANG 4. DOCALCIC.

1	69.30	15.91	3.20	0.18	0.21	5.92	3.35	0.14	1.80	0.52	0.48	none	0.11	S 0.03	101.15	
B2. III	1.155	.156	.020	.003	.005	.105	.054	.001			.006	—	.002			
2	68.87	16.42	1.91	2.06	2.54	4.64	1.25	1.10	1.12						99.91	
A3. III	1.148	.161	.012	.029	.064	.083	.020	.012								
3	75.60	14.11	0.64	n. d.	0.29	5.72	2.81	0.48	0.46	0.09	0.27	trace			100.47	2.643
A3. III	1.260	.138	.004	(.008)	.007	.102	.045	.005			.003					

CLASS I. PERSALANE.

RANG 1. PERALKALIC. LIPARASE. (C. I. P. W., 1902.)

1	69.76	13.14	1.44	0.66	0.18	0.36	2.52	11.90	0.42						100.38	
A73. III	1.163	.129	.009	.009	.005	.006	0.40	.127								
2	70.26	14.38	trace	—	0.45	0.63	0.40	12.12	0.99				0.06	FeS ₂ 1.60	100.89	
A73. III	1.171	.141	—	—	.011	.011	.007	.129					.001			
3	68.10	14.42	0.80	n. d.	none	0.68	0.32	12.13	1.15	0.19			0.06	FeS ₂ 2.16	99.97	2.559
A73. III	1.135	.141	.005	(.010)	—	.012	.005	.129					.001			
4	73.53	12.87	0.88	0.64	0.56	0.07	0.63	8.92	0.70	0.40	0.19	trace	0.09	CO ₂ 0.23 S 0.02 Cr ₂ O ₃ none BaO 0.05	99.78	
A1. I	1.226	.126	.006	.009	.014	.001	.010	.095			.002	—	.001			
5	70.65	16.16	1.53	0.52	trace	0.55	0.54	8.66	1.22				trace		99.83	2.62
A3. III	1.178	.159	.009	.007	—	.010	.009	.092					—			
6	71.53	13.51	1.55	1.16	0.22	0.26	0.46	10.50	0.49		0.22	0.05	0.01	S 0.06	100.07	
A2. II	1.192	.133	.010	.016	.006	.005	.007	.112			.003	—	—		(100.02)	

ORDER 3. QUARFELIC. COLUMBARE—Continued.

SUBRANG 5. PERSODIC. VULCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	I.3.(2)3.5.	Q 48.54 hy 1.13 or 1.67 mt 1.16 ab 30.30 il 1.06 an 11.40 ap 2.35 C 2.96	Zdirec, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and von John, Jb. G. R.-A. Wien, LIX, p. 136, 1909.	Granite gneiss.	P ₂ O ₅ high?
8	I.3''.(2)3.5.	Q 39.42 di 1.97 or 1.11 hy 1.66 ab 39.30 mt 1.16 an 14.46 ap 0.34	Tschingelfüh, Haslithal, Bernese Alps, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Quartz porphyry. (schistose).	

SUBRANG 3. SODIPOTASSIC.

1	I(II).3.''4.3.	Q 48.78 hy 5.30 or 9.45 mt 3.25 ab 9.96 hm 1.60 an 19.46 C 2.14	Proschwitz, Isergebirge, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 124, 1902.	Granite.	
2	I(II).3.(3)4.''3.	Q 46.92 hy 10.31 or 11.68 mt 0.46 ab 8.38 il 1.37 an 18.63 C 1.73	Pieman, Tasmania.	W. F. Hille- brand.	U. S. G. S. B. 228, p. 276, 1904.	Moldavite.	"Buttons." Igneous?
3	I.3.4.''3.	Q 40.44 hy 1.90 or 26.69 mt 0.70 ab 17.29 il 0.30 an 6.95 hm 1.76 C 2.14	Puketin, Tairua, Hauraki, New Zealand.	Survey lab.	Bell and Fraser, N. Z. G. S. B. 15, p. 45, 1912.	Rhyolite.	

SUBRANG 4-5. PRESODIC.

1	I.3(4).(3)4.5.	Q 36.90 hy 0.50 or 0.56 il 0.46 ab 23.30 hm 3.20 an 28.08 tn 0.59	Seminole Mine, Lincoln County, Georgia.	E. Everhardt.	S. P. Jones, G. S. Ga. B. 19, p. 59, 1909.	Granite porphyry.	
2	I(II).3.4.(3)4.	Q 42.54 hy 8.64 or 6.67 mt 2.78 ab 10.48 an 23.07 C 4.69	Vorderberg, n. Lomnitz, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XII, p. 214, 1899.	Quartz porphyry.	In W. T., p. 143.
3	I.3.(3)4.(4)5.	Q 45.48 di 2.75 or 2.78 wo 0.23 ab 23.58 il 0.46 an 24.46	Posto di Cavoli, S. Piero in Campo, Elba.	Author.	G. d'Achiardi, Mem. Soc. Tosc. Sc. N., XIX, p. 121, 1903.	Granite.	Contact with limestone.

ORDER 4. QUARDOFELIC. BRITANNARE. (C. I. P. W., 1902.)

SUBRANG 1. PERPOTASSIC. LEBACHOSE. (C. I. P. W., 1902.)

1	I(11).4.1.1.	Q 18.24 ac 4.16 or 70.61 ns 3.54 ab 1.05 di 1.43 hy 0.96	Mt. Houghton, Keweenaw Point, Michigan.	F. P. Burrall.	L. L. Howard, G. S. Mich., VI (II), p. 42, 1898.	Felsite.	Not in W. T.
2	I.4.1.1.⊙	Q 19.62 di 1.30 or 71.72 hy 0.63 ab 3.67 pr 1.60 an 1.39	Homestake Mine, Lead, South Dakota.	W. J. Sharwood.	W. J. Sharwood, Ec. Geol., VI, p. 734, 1911.	Rhyolite.	Altered?
3	I.4.1.1.⊙	Q 18.06 di 1.24 or 71.72 hy 0.79 ab 2.62 pr 2.16 an 1.95	Homestake Mine, Lead, South Dakota.	W. J. Sharwood.	W. J. Sharwood, Ec. Geol., VI, p. 734, 1911.	Rhyolite.	Altered?
4	I.''4.1.1(2).	Q 34.68 hy 1.66 or 52.82 mt 1.39 ab 5.24 il 0.30 an 0.28 C 2.04	Solomon Mine, Creede, Colorado.	W. C. Wheeler.	W. H. Emmons, U. S. G. S. rec. lab.	Rhyolite.	
5	I.(3)4.1''1''.	Q 33.12 mt 1.62 or 51.15 hm 0.32 ab 4.72 an 2.78 C 4.90	Chywoon Morvah, Cornwall.	J. A. Phillips.	J. J. H. Teall, Brit. Petr., p. 314, 1888.	Granite.	In W. T., p. 143.
6	I.4.1.1.⊙	Q 27.54 hy 1.00 or 62.27 mt 2.32 ab 3.67 il 0.46 an 1.39 C 0.92	Stampers, Sala, Sweden.	G. Nyblom.	H. J. Sjogren, G. F. F., XXXII, p. 1370, 1910.	Hälleflinta.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	74.8	13.4	—	—	0.3	1.3	0.9	9.7	0.3						100.7	
B3. IV	1.247	.131	—	—	.008	.023	.015	.103								
8	68.13	15.75	1.60	0.74	0.45	0.27	0.61	10.54	1.90		0.31	trace		SO ₃ 0.07	100.37	2.573
A2. II	1.136	.154	.010	.010	.011	.005	.010	.112			.004	—				
9	69.06	14.41	1.89	0.54	0.39	trace	0.24	12.33	0.96		0.24	0.08		CO ₂ SO ₃ 0.09 0.28	100.51	2.553
A2. II	1.151	.141	.012	.007	.010	—	.004	.131			.003	—				
10	69.13	15.33	0.42	1.24	0.07	0.48	0.96	11.30	0.75	0.08				S 0.12	99.88	
A3. III	1.152	.150	.003	.017	.002	.009	.016	.120								
11	70.75	12.44	2.66	0.79	0.08	0.39	0.39	11.51	0.84		0.53	0.10	0.09		100.57	
A2. II	1.179	.122	.017	.011	.002	.007	.006	.122			.007	.001	.001			
12	67.37	12.53	6.37	0.49	0.97	trace	0.03	10.01	1.36	0.56	0.69		trace	CO ₂ trace	100.38	2.623
A2. II	1.123	.123	.040	.007	.024	—	—	.106			.009		—			

RANG 1. LIPARASE.

1	73.92	14.26	0.30	n. d.	none	none	2.06	8.99	0.11		none	trace			99.64	
A3. III	1.232	.140	.002	(.004)	—	—	.033	.096			—	—				
2	73.89	13.75	0.26	n. d.	none	none	2.10	9.00	1.21		none	trace			100.21	
A3. III	1.232	.135	.002	(.004)	—	—	.034	.096			—	—				
3	72.76	15.47	—	—	none	0.19	2.35	9.28	0.15						100.20	
A3. III	1.213	1.51	—	—	—	.003	.038	.099								
4	71.00	16.31	—	—	none	.022	3.44	8.66	0.12						99.75	
A3. III	1.183	.160	—	—	—	.004	.055	.092								
5	72.76	15.47	n. d.	n. d.	none	0.19	2.35	9.28	0.15						100.20	
A3. III	1.213	.151	—	—	—	.004	.038	.099								
6	68.66	12.98	2.89	1.26	0.76	2.63	2.05	7.50	0.48	0.09	0.19	0.07	0.24	F S BaO 0.01 0.08 0.07	99.96	
A1. I	1.144	.127	.018	.018	.019	.046	.033	.080			.002	—	.003			
7	71.91	15.71	0.21	0.13	0.03	0.70	2.61	8.60	0.27		0.03	0.11	0.02	CO ₂ SO ₃ BaO 0.22 0.05 0.14	100.71	
A1. I	1.199	.154	.001	.002	.001	.013	.042	.091			—	.001	—			
8	76.26	11.30	0.52	0.34	0.02	0.23	2.81	6.77	0.14	0.39	0.15	0.01	0.05	CO ₂ S BaO 0.19 0.26 0.49	99.93	
A1. I	1.271	.111	.003	.005	—	.004	.045	.072			.002	—	—			
9	75.20	12.96	0.37	0.27	0.12	0.29	2.02	8.38	0.58			trace	0.03		100.22	
A3. III	1.253	.127	.002	.004	.003	.005	.032	.089				—	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 1. PERPOTASSIC. LEBACHOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	I.4.1''1(2).	Q 29.70 di 1.73 or 57.27 wo 0.23 ab 7.86 an 3.61	Kangasniemi, Finland.	M. Jaatinen.	B. Frosterus, B. Com. G. Finl., No. 4, p. 22, 1896.	Kugel granite (microcline zone).	Not in W. T.
8	I.4.1.1''.	Q 22.98 hy 1.10 or 62.27 mt 0.93 ab 5.24 il 0.91 an 1.39 hm 0.64 C 2.75	Himmelbach, Bl. Lebach, Prussia.	K. Boettcher.	Weiss and Grebe, Erl. G. Kte. Pr., Bl. Lebach., p. 30, 1889.	Quartz porphyry.	In W. T., p. 143.
9	I.4.1.1.⊙	Q 19.86 hy 1.00 or 72.83 mt 0.93 ab 2.10 il 0.46 C 0.61 hm 1.28	Mutterbach, Masserthal, Thuringerwald.	Hampe.	H. Loretz, Jb. Pr. G. L-A., (1888), p. 295, 1889.	Quartz porphyry.	In W. T., p. 143.
10	I.4.1.1(2).	Q 18.12 hy 1.66 or 66.72 mt 0.70 ab 8.38 an 2.50 C 0.51	Vajdoja, Verespatak, Hungary.	B. Ruzitska.	G. v. Szadeczky, F. K., XXIX, p. 450, 1909.	Rhyolite.	
11	I''4.1.1.	Q 24.96 ac 2.77 or 67.83 di 0.76 mt 0.93 il 1.06 hm 1.12 ap 0.34	Manzoyama, Shimoda Bay, Izu, Nippon, Japan.	K. Yokoyama.	S. Kozu, J. G., XX, p. 47, 1912.	Rhyolite.	
12	I(II)''4.1.1.	Q 27.78 hy 2.40 or 58.94 il 1.06 C 1.73 hm 6.37 ru 0.16	Pelapis Islands, northwest of Borneo.	M. Dittrich.	C. E. A. Wichmann, K. Ak. Weteus. Amst., p. 348, 1912.	Rhyolite.	

SUBBRANG 2. DOPOTASSIC. OMEOSE. (C. I. P. W., 1902.)

1	I.4.1.2.⊙	Q 27.24 hy 0.53 or 53.38 ab 17.29 C 1.12	Topsham, Maine.	G. Steiger.	E. S. Bastin, U. S. G. S. B. 420, p. 14, 1910.	Graphic granite.	
2	I.4.1.2.⊙	Q 26.88 hy 0.53 or 53.38 ab 17.82 C 0.51	Topsham, Maine.	G. Steiger.	E. S. Bastin, U. S. G. S. B. 420, p. 14, 1910.	Graphic granite.	
3	I.4.1.2.⊙	Q 23.10 or 55.04 ab 19.91 an 0.83 C 1.12	Auburn, Maine.	G. Steiger.	E. S. Bastin, U. S. G. S. rec. lab.	Graphic granite.	
4	I.4''1.2(3).	Q 17.58 or 51.15 ab 28.82 an 1.11 C 0.92	Portland, Connecticut.	G. Steiger.	E. S. Bastin, U. S. G. S. B. 420, p. 14, 1910.	Graphic granite.	
5	I.4.1.2.⊙	Q 22.98 or 55.04 ab 19.91 an 1.11 C 1.02	Bedford, Westchester County, New York.	G. Steiger.	E. S. Bastin, U. S. G. S. B. 420, p. 14, 1910.	Graphic granite.	
6	I(II).4.1(2).2.	Q 23.22 di 4.85 or 44.48 wo 1.16 ab 17.29 mt 3.71 an 3.89 il 0.30 hm 0.32	Lake Catlin, Adirondack Mountains, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R., LX, (2), p. 526, (1906) 1907.	Quartz syenite.	
7	I.4.1''2''.	Q 22.74 hy 0.23 or 50.60 mt 0.23 ab 22.01 ap 0.34 an 2.78 C 1.12	Pompton Junction, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1908), p. 65, 1909.	Granite (pegmatite).	
8	I(3)4.1.2(3).	Q 34.80 ac 1.39 or 40.03 ns 0.37 ab 20.44 di 0.75 wo 0.46 il 0.30	Creede, Colorado.	W. C. Wheeler.	W. H. Emmons, U. S. G. S. rec. lab.	Rhyolite.	
9	I.4.1.2.⊙	Q 30.72 hy 0.43 or 49.48 mt 0.56 ab 16.77 an 1.39	Round Mountain, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, Pr. Colo. Sc. Soc., II, p. 233, 1887.	Rhyolite.	Also in U. S. G. S. A. R. 17, (II), p. 234, 1896. In W. T., p. 143.

CLASS I. PERSALANE—Continued.

RANG 1. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.		
10	73.90	13.65	0.28	0.42	0.14	0.23	2.53	7.99	0.33	0.16	0.07	0.05	trace	BaO SrO Li ₂ O	trace none trace	99.75		
A1. I	1.232	.134	.002	.005	.004	.004	.040	.085			.001	—	—					
11	68.91	14.27	0.90	0.23	0.67	.060	1.96	7.15	1.12	0.43	0.41	0.16	0.02	CO ₂ FeS ₂ BaO	0.26 3.32 0.08	100.49		
A1. I	1.149	.140	.006	.003	.017	.011	.032	.077			.005	.001	—					
12	66.46	14.14	4.07	0.40	0.67	0.78	1.26	9.26	1.28	0.78	0.83	0.25	0.03	CO ₂ ZrO ₃ S BaO SrO	none 0.05 none 0.06 0.03	100.35		
A1. I	1.108	.139	.025	.006	.017	.014	.020	.099			.010	.002	—					
13	73.93	13.77	0.25	0.19	0.08	0.48	2.00	9.16	0.16				none	0.03	CO ₂ Li ₂ O	trace trace	100.05	
A3. III	1.232	.135	.002	.003	.002	.009	.032	.098					—	—				
14	64.11	16.52	0.41	1.07	1.85	1.00	1.64	8.26	1.71	0.58	0.75	0.40	0.01	CO ₂ ZrO ₂ SO ₃ FeS ₂ BaO SrO CuFeS ₂	0.48 0.03 none 0.32 0.07 0.04 0.95	100.20		
A1. I	1.069	.162	.003	.015	.048	.018	.027	.088			.009	.003	—					
15	77.0	12.5	0.5	n. d.	0.1	none	2.8	7.6	0.3							100.8		
B3. IV	1.283	.122	.003		.003	—	.045	.081										
16	74.60	11.23	1.52	n. d.	0.25	0.45	1.61	8.71	1.70		0.05					100.12		
A3. III	1.243	.110	.009	—	.006	.008	.026	.093			—							
17	71.12	13.35	1.37	1.28	0.47	0.32	2.02	9.82	1.13							100.88		
A3. III	1.185	.131	.009	.018	.012	.005	.032	.104										
18	70.36	12.20	1.59	2.44	0.55	1.15	2.41	6.85	0.93		0.70	0.28	trace			99.56		
A2. II	1.173	.120	.010	.034	.014	.021	.039	.073			.009	.002						
19	74.58	13.37	0.24	n. d.	none	0.32	1.16	9.80	0.57							100.04	2.59	
A3. III	1.243	.131	.002	(.004)	—	.006	.019	.104										
20	72.41	14.55	0.30	n. d.	none	0.13	2.19	10.09	0.28							99.95	2.58	
A3. III	1.207	.143	.002	(.004)	—	.002	.035	.107								(99.91)		
21	74.66	11.49	2.02	n. d.	0.10	0.44	1.69	8.68	0.74			0.07	0.08			99.97	2.598	
A3. III	1.244	.113	.013	(.012)	.003	.008	.027	.093				—	.001				20°	
22	71.61	13.85	1.51	0.37	1.14	0.29	1.24	7.46	1.59	0.93	0.23	0.05		CO ₂ SO ₃	0.13 0.08	100.48		
A2. II	1.194	.136	.009	.005	.029	.005	.020	.080			.003	—						
23	63.25	16.53	3.10	0.26	0.53	0.26	1.19	11.00	2.71		0.52	0.27		CO ₂ SO ₃	none 0.12	99.74	2.559	
A2. II	1.054	.162	.020	.004	.013	.004	.018	.117			.007	.002						
24	70.33	14.29	1.35	1.59	0.72	0.27	2.50	7.46	1.38			trace		SO ₃	0.05	99.94	2.568	
A3. III	1.172	.140	.009	.022	.018	.005	.040	.080				—						
25	69.98	14.52	2.35	0.90	0.52	0.11	1.93	7.80	1.68			trace		SO ₃	0.06	99.85	2.565	
A3. III	1.166	.142	.015	.013	.013	.002	.031	.083				—						

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 2. DOPOTASSIC. OMOOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	I.4.1.2".	Q 28.08 hy 0.63 or 47.26 mt 0.46 ab 20.96 il 0.15 an 1.11 C 0.51	Currant Creek, Pikes Peak, Colorado.	W. F. Hille- brand.	E. B. Mathews, J. G., VIII, p. 237, 1900.	Granite.	In W. T., p. 143.
11	I".4.1".2.	Q 27.72 hy 1.70 or 42.31 il 0.46 ab 16.77 hm 0.98 an 2.22 ru 0.16 C 2.35 ap 0.34 pr 3.32	Leadville, Colorado.	C. Palmer.	J. D. Irving, U. S. G. S. rec. lab.	Porphyry.	
12	I".4.1".2.	Q 22.26 hy 1.70 or 55.04 il 1.06 ab 10.48 hm 4.07 an 0.83 ap 0.67 C 1.63 tn 0.78	Goldroad Mine, Mojave County, Arizona.	G. Steiger.	F. C. Schrader, U. S. G. S. B. 397, p. 39, 1909.	Trachyte.	
13	I.4.1.2.⊙	Q 26.22 di 0.68 or 54.49 wo 0.35 ab 16.77 mt 0.46 an 0.83	Anita Mine, Riverside County, California.	W. T. Schaller.	W. T. Schaller, U. S. G. S. rec. lab.	Graphic granite.	
14	I".4.1".2.	Q 18.72 hy 5.20 or 45.93 mt 0.70 ab 14.15 il 1.37 an 2.22 ap 1.01 C 3.06	Ely, Nevada.	G. Steiger.	A. C. Spencer, U. S. G. S. rec. lab.	Monzonite.	
15	I".4.1.2".	Q 31.92 ac 1.85 or 45.04 hy 0.30 ab 21.48	Greve des Fontaines, St. Quay, Brittany, France.	J. de Lapparent.	J. de Lapparent, B. Soc. Min. Fr., XXXIII, p. 265, 1910	Graphic pegmatite.	
16	I.(3)4.1.(1)2.	Q 31.98 ac 4.16 or 51.71 di 1.30 ab 8.91 wo 0.23	Mont Pelet, Esterel, France.	Pisani.	A. Michel-Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 40, 1912.	Pitchstone.	
17	I".4.1.2.	Q 20.98 ac 2.31 or 57.82 di 1.18 ab 14.15 hy 2.45 mt 0.93	Torre de la Testa, Cabo de Gata, Spain.	A. Osann.	A. Osann, Z. D. G. G., XLIII, p. 695, 1891.	Liparite.	In W. T., p. 143.
18	I".4.1".2(3).	Q 27.00 di 1.40 or 40.50 hy 2.68 ab 20.41 mt 2.32 an 2.22 il 1.37 ap 0.67	Kuntivara, Kuulosamo, Finland.	N. Sahlbom.	V. Hackmann, B. Com. G. Finl., No. 15, p. 41, 1905.	Quartz porphyry.	
19	I.4.1.".2.	Q 29.34 hy 0.53 or 57.82 ab 9.96 an 1.67 C 0.20	Skarpö, n. Vaxholm, Sweden.	A. Bygden.	A. Bygden, B. G., Inst. Ups., VII, p. 5 (1905), 1906.	Graphic granite.	
20	I.4.1.2.⊙	Q 20.88 di 0.25 or 58.94 hy 0.40 ab 18.34 an 0.28	Elfkärlö, Uppland, Sweden.	A. Bygden.	A. Bygden, B. G., Inst. Ups., VII, p. 5 (1905), 1906.	Graphic granite.	
21	I".4.1.".2.	Q 30.84 ac 3.23 or 51.71 di 1.92 ab 10.48 hy 1.02	Gross Umstadt, Odenwald.	C. Vogel.	C. Vogel, In. Diss. Gies., p. 49, 1891.	Quartz porphyry.	Not in W. T.
22	I.(3)4.1.2.	Q 33.30 hy 2.90 or 44.48 mt 0.46 ab 10.48 il 0.46 an 1.39 hm 1.12 C 3.16	Wingertsberg, Bl. Furfeld, Rheinhesse.	Not stated.	H. Schopp, Erl. G. Kt. Hess., Bl. Furfeld, p. 48, 1913.	Quartz porphyry.	
23	I.4".1.(1)2.	Q 13.86 hy 1.30 or 65.05 il 0.61 ab 9.43 hm 3.10 C 2.75 ru 0.24 ap 0.34	Heckmannsloch, Bl. Wahlen, Prussia.	K. Gremse.	H. Grebe, Erl. G. Kte. Pr., Bl. Wahlen, p. 29, 1889.	Quartz porphyry.	In W. T., p. 145.
24	I.4.1.2".	Q 24.66 hy 3.52 or 44.48 mt 2.09 ab 20.96 an 1.39 C 1.53	Bet. Schomberg and Libau, Sudetische Mulde, Bohemia.	Pfeiffer.	G. Berg, Jb. Pr. G. L.-A., XXVIII, p. 239, (1907), 1910.	Felsite.	
25	I.4.1.2.⊙	Q 27.90 hy 1.30 or 46.15 mt 3.02 ab 16.24 hm 0.32 an 0.58 C 2.65	Heilige Berg, Libau, Sudetische Mulde, Bohemia.	Eyme.	G. Berg, Jb. Pr. G. L.-A., XXVIII, p. 239, (1907), 1910.	Felsite.	

CLASS I. PERSALANE—Continued.

RANG I. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
26	67.08	15.04	4.16	0.73	0.92	0.20	2.74	6.96	2.31			0.19		SO ₂ 0.06	100.39	2.53
A2. II	1.118	.147	.026	.010	.023	.004	.044	.074				.001				
27	71.52	15.44	0.72	0.94	0.29	0.73	1.54	7.19	0.52	0.94					99.83	
A3. III	1.192	.151	.005	.013	.007	.013	.025	.077								
28	71.09	15.48	trace	trace	0.72	0.70	2.58	8.62	0.79		trace				99.98	
A3. III	1.185	.152	—	—	.018	.013	.042	.091								
29	74.63	11.29	1.48	0.44	0.70	1.14	2.70	6.81	0.57	0.13	0.20				100.09	2.64
A2. II	1.244	.111	.009	.006	.018	.020	.044	.072			.003					
30	70.91	15.32	trace	n. d.	0.07	0.58	2.31	10.07	0.51						99.77	2.564
A3. III	1.182	.150	—	—	.002	.010	.037	.107								
31	68.87	16.62	0.43	2.72	1.60	0.71	1.80	6.48	0.74			0.05			100.02	2.762
A3. III	1.148	.163	.003	.038	.040	.012	.029	.069				—				
32	72.42	15.61	none	0.79	0.11	0.27	1.92	8.53	0.60	0.04	0.02	none	0.01	CO ₂ SO ₂ none 0.13	100.45	
A2. II	1.207	.153	—	.011	.003	.005	.031	.090								
33	67.08	17.87	1.12	0.43	0.22	0.61	2.34	9.43	0.97	0.07	0.07	0.19	0.28	CO ₂ SO ₂ none 0.08	100.76	
A2. II	1.118	.175	.007	.006	.006	.011	.038	.100			.001	.001	.004			

RANG I. PERALKALIC. LIPARASE.

1	76.03	12.02	0.69	0.68	0.18	1.61	2.97	5.72	0.20		0.28				100.38	
A3. III	1.267	.118	.004	.009	.005	.029	.048	.061			.004					
2	71.24	13.78	1.30	2.83	trace	0.38	5.32	5.10	n. d.		0.68		0.15		100.78	2.64
A2. II	1.187	.135	.008	.039	—	.067	.085	.054			.008		.002			
3	75.98	12.34	0.85	0.93	0.15	0.13	4.02	4.44	0.64	0.24	0.17	0.03	trace	CO ₂ none 0.03 ZrO ₂ none S none NiO none BaO 0.07 SrO trace Li ₂ O trace	100.02	
A1. I	1.266	.121	.005	.012	.004	.002	.064	.047			.002	—	—			
4	73.69	12.46	1.21	1.75	0.17	0.36	4.47	4.92	0.24	0.14	0.28	0.04	0.15	CO ₂ trace 0.14 ZrO ₂ none FeS ₂ none Cl 0.02 F 0.05 BaO none	100.09	
A1. I	1.228	.122	.007	.024	.004	.007	.072	.052			.004	—	.002			
5	73.03	13.43	0.40	1.49	0.14	0.79	4.91	4.54	0.35	0.18	0.30	0.06	0.15	ZrO ₂ 0.06 Cl 0.03 F 0.08 FeS ₂ 0.09 BaO trace	100.03	
A1. I	1.217	.132	.003	.020	.004	.014	.079	.048			.004	—	.002			
6	71.90	14.12	1.20	0.86	0.33	1.13	4.52	4.81	0.42	0.18	0.35	0.11	0.05	ZrO ₂ 0.04 CO ₂ 0.21 Cl 0.02 F 0.06 S trace BaO 0.04 NiO none	100.35	
A1. I	1.198	.138	.008	.012	.008	.020	.072	.051			.004	.001	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 2. DOPOTASSIC. OMEOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
26	I''4.1.2(3).	Q 23.22 hy 2.30 or 41.14 mt 2.32 ab 23.06 hm 4.16 C 2.96 ap 0.34	Gottschenberg, n. Libau, Sudetische Mulde, Bohemia.	Eyme.	G. Berg, Jb. Pr. G. L.-A., XXVIII, p. 239, (1907), 1909.	Felsite.	
27	I.(3)4.1(2).2.	Q 32.34 hy 1.76 or 42.81 mt 1.16 ab 13.10 an 3.61 C 3.73	Mt. Vapa, Persanyer Gebirge, Hungary.	Not stated.	S. von Szentpetery, Nw. Mus. Hft. Kolosv., IV, p. 21, 1910.	Orthoclase porphyry.	
28	I.4.1''2.	Q 20.58 hy 1.80 or 51.15 ab 21.48 an 3.61 C 0.61	Monte Mulatto, Tyrol.	J. A. Ippen.	J. A. Ippen, Sb. Wien. Akad., CXI, p. 266, 1906, I.	Granite aplite.	
29	I''4.1.2''.	Q 31.92 ac 2.31 or 40.03 di 3.89 ab 19.39 wo 0.23 mt 0.70 il 0.46 hm 0.16	Voralp, Aarmassif, Switzerland.	O. Fischer.	O. Fischer, T. M. P. M., XXIV, p. 72, 1905.	Granite porphyry.	Center of dike. Of I.4.1.3. No. 199.
30	I.4''1.2.	Q 18.00 di 0.43 or 59.49 hy 0.23 ab 19.39 an 1.67	Wilsons Creek, Omeo, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XXIV, p. 120, 1888.	Graphic granite.	In W. T., p. 145.
31	I''4.1(2).2.	Q 27.66 hy 8.62 or 38.36 mt 0.70 ab 15.20 an 3.34 C 5.41	Wilsons Creek, Omeo, Victoria.	A. W. Howitt.	Tr. R. Soc. Vict., XXIV, p. 122, 1888.	Granite.	In W. T., p. 145.
32	I.4.1.2. ⊙	Q 27.42 hy 1.75 or 50.04 ab 16.24 an 1.39 C 2.75	Rough River, Maimai, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Pegmatite.	
33	I.4''1.2.	Q 15.96 hy 0.86 or 55.60 mt 1.62 ab 19.91 il 0.15 an 4.19 ap 0.34 C 2.96	Charleston, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Pegmatite.	

SUBRANG 3. SODIPOTASSIC. LIPAROSE. (C. I. P. W., 1902.)

1	I.(3)4.1''3.	Q 34.14 di 1.33 or 33.32 wo 1.63 ab 25.15 mt 0.23 an 2.50 il 0.61	Umanak Island, Nugsuaks Penin- sula, Greenland.	W. C. Phalen.	W. C. Phalen, Smiths. Misc. Coll., XLV, p. 187, 1904.	Granite.	
2	I''4.1.3(4).	Q 19.50 ac 1.85 or 30.02 di 1.73 ab 42.44 hy 2.90 mt 0.93 il 1.22	Iviangusat, Kangerdluarsuk, Greenland.	C. Detlefsen.	N. V. Ussing, G. Julhb., p. 114, 1911.	Soda granite.	
3	I.(3)4.1.3.	Q 35.22 hy 1.04 or 26.16 mt 1.16 ab 33.54 il 0.30 an 0.56 C 0.82	Haystack Mountain, Arcostook County, Maine.	W. F. Hille- brand.	H. E. Gregory, U. S. G. S. B. 165, p. 155, 1900.	Rhyolite.	In W. T., p. 145.
4	I.4.1.3''.	Q 26.88 ac 0.92 or 28.91 di 1.67 ab 37.73 hy 1.78 mt 1.16 il 0.61	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 75, 1903.	Paisanite.	In W. T., p. 145.
5	I.4.1.3(4).	Q 25.02 di 2.16 or 26.69 hy 1.26 ab 41.40 mt 0.70 an 1.39 il 0.61	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 75, 1903.	Paisanite.	In W. T., p. 145.
6	I.4.1(2).3''.	Q 21.20 di 0.43 or 28.36 hy 0.60 ab 37.73 mt 1.86 an 4.17 il 0.61 ap 0.34	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 84, 1903.	Granite.	In W. T., p. 145.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	72.26	13.59	1.16	2.18	0.06	1.13	3.85	5.58	0.47		0.45		trace		100.73	2.65
A2. II	1.204	.133	.007	.031	.002	.020	.062	.060			.006		—			
8	73.09	12.76	1.07	4.28	0.09	0.30	3.16	5.10	0.73		0.45		0.08		101.06	2.66
B2. III	1.218	1.25	.007	.060	.002	.005	.051	.054			.006		.001			
9	71.07	12.34	2.25	4.92	0.19	.055	2.84	5.53	0.72		0.27		trace		100.68	2.68
A2. II	1.185	.121	.014	.068	.005	.010	.046	.059			.003		—			
10	75.38	11.85	1.78	0.88	none	0.33	3.68	5.37	0.50	0.15			0.10		100.02	2.62
A3. III	1.256	.116	.011	.013	—	.005	.060	0.57					.001			
11	73.33	12.95	0.98	1.66	none	0.98	3.46	5.61	0.30	0.11			0.13		99.51	
A3. III	1.222	.127	.006	.024	—	.018	.056	.060					.002			
12	72.25	13.40	1.10	1.53	none	0.74	4.27	5.56	0.31	0.10			0.11		99.37	2.643
B3. IV	1.204	.121	.007	.021	—	.013	.069	.060					.001			
13	75.65	12.89	0.89	1.11	0.20	0.48	3.71	5.50	0.15	0.08	0.05				100.71	
A3. III	1.261	.126	.006	.015	.005	.009	.060	.059			—					
14	69.51	15.06	1.25	1.63	0.05	0.31	5.48	6.02	0.23	0.11	0.29	trace	trace	CO ₂ none BaO none	99.95	
A2. II	1.159	.148	.008	.022	.001	.005	.097	.059			.004	—	—			
15	77.08	12.54	none	0.95	0.01	0.75	3.64	4.99	n. d.						99.96	
A3. III	1.285	.123	—	.013	—	.013	.059	.053								
16	77.61	11.94	0.55	0.87	trace	0.31	3.80	4.98	0.23	trace	0.25		trace		100.54	2.618
A3. III	1.294	.117	.004	.012	—	.006	.061	.053			.003		—			18°
17	77.49	11.89	0.34	1.12	0.09	0.45	4.58	4.26	0.16				trace		100.63	
A3. III	1.292	.117	.002	.015	.002	.008	.074	.045					—			
18	76.44	12.95	0.19	0.89	trace	0.15	4.76	4.95	0.09		0.37		trace		100.79	
A3. III	1.274	.127	.001	.012	—	.003	.077	.053			.005		—			
19	76.49	11.89	1.16	1.56	trace	0.14	4.03	5.00	0.38	0.12	trace		trace		100.77	2.650
A3. III	1.275	.117	.007	.022	—	.002	.064	.053			—		—			13°
20	71.40	14.76	1.68	0.72	0.55	0.10	4.79	5.16	1.46				trace		100.62	
A3. III	1.190	.145	.011	.010	.014	.002	.077	.055					—			
21	70.23	15.00	1.99	n. d.	0.38	0.33	4.98	4.99	1.23	0.91	0.03	0.06	0.24		100.42	
A2. II	1.171	.147	.012	(.024)	.010	.006	.080	.053				—	.003			
22	67.35	15.05	1.23	4.76	0.03	0.55	4.42	6.08	0.17	0.16	0.60		0.05		100.45	2.69
A3. III	1.123	.148	.008	.066	.001	.010	.071	.065			.008		—			17°
23	71.90	12.98	0.81	2.85	0.02	1.04	4.19	5.60	0.20	0.20	0.34	0.04	0.08	ZrO ₂ 0.12 BaO trace SrO trace	99.87	2.651
A1. I	1.198	.127	.005	.040	—	.019	0.68	.060			.004	—	.001			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPIOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	I.4.1''3.	Q 25.26 di 2.20 or 33.36 hy 1.42 ab 32.49 mt 1.62 an 3.06 fl 0.91	Mount Willard, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XXI, p. 25, 1881.	Granite.	Normal. Not in W. T.
8	I.(3)4.1.3.	Q 31.68 hy 6.54 or 30.02 mt 1.62 ab 26.72 fl 0.91 an 1.39 C 1.53	Mount Willard, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XXI, p. 25, 1881.	Granite.	3 feet from contact. Not in W. T.
9	I''4.1''3.	Q 28.74 hy 7.23 or 32.80 mt 3.25 ab 24.10 fl 0.46 an 2.78 C 0.61	Mount Willard, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XXI, p. 25, 1881.	Granite.	2 inches from contact. Not in W. T.
10	I''4.1.3.	Q 32.76 di 0.49 or 31.69 hy 0.53 ab 31.44 mt 2.15	Mount Kearsarge, New Hampshire.	J. H. Perry.	J. H. Perry, J. G., XI, p. 408, 1903.	Quartz porphyry.	
11	I.4.1''3.	Q 28.62 di 1.73 or 33.34 hy 1.72 ab 29.34 mt 1.39 an 3.06	Mount Kearsarge, New Hampshire.	J. H. Perry.	J. H. Perry, J. G., XI, p. 409, 1903.	Quartz porphyry.	
12	I.4.1.3.○	Q 23.94 di 2.97 or 33.34 hy 0.40 ab 36.15 mt 1.62 an 0.56	Mount Kearsarge, New Hampshire.	J. H. Perry.	J. H. Perry, J. G., XI, p. 409, 1903.	Quartz porphyry.	
13	I''4.1.3.	Q 31.02 di 0.46 or 32.80 hy 1.46 ab 31.44 mt 1.39 an 1.95	Mount Gunstock, Belknap Mountains, New Hampshire.	H. S. Washington.	Pirsson and Washington, A. J. S., XXII, p. 440, 1906	Quartz syenite aplite.	
14	I''4(5).1.3(4).	Q 12.90 ac 3.70 or 32.80 di 1.21 ab 46.63 hy 1.40 fl 0.61	Red Hill, New Hampshire.	H. S. Washington.	Pirsson and Washington, A. J. S., XXIII, p. 441, 1907.	Paisanite.	Dike in No. 3, I.6.1.4.
15	I.(3)4.1''3.	Q 34.56 di 0.49 or 29.47 hy 1.45 ab 30.92 an 3.06	Milford, Massachusetts.	L. P. Kinnicut.	T. N. Dale, U. S. G. S. B. 354, p. 79, 1908.	Granite.	
16	I.(3)4.1.3.	Q 35.76 di 0.65 or 29.47 hy 0.26 ab 31.96 mt 0.93 an 0.83 fl 0.46	Rockport, Cape Ann, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 793, 1898.	Granite.	In W. T., p. 145.
17	I''4.1.3(4).	Q 33.42 ac 0.92 or 25.02 di 1.95 ab 37.73 hy 1.16	Bass Rocks, Cape Ann, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 107, 1899.	Aplite.	Border of dike. In W. T., p. 145.
18	I.4.1.3''.	Q 29.16 ac 0.46 or 29.47 di 0.75 ab 39.82 hy 0.53 fl 0.76	Bass Rocks, Cape Ann, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 107, 1899.	Aplite.	Center of dike. In W. T., p. 145.
19	I.(3)4.1.3.	Q 33.12 ac 0.46 or 29.46 di 0.49 ab 33.54 hy 1.72 mt 1.62	Magnolia, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 113, 1899.	Paisanite.	In W. T., p. 145.
20	I.4.1.3''.	Q 22.80 hy 1.40 or 30.58 mt 2.32 ab 40.35 hm 0.16 an 0.56 C 1.12	Marblehead Neck, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VII, p. 293, 1899.	Keratophyre (bostonite).	In W. T., p. 145.
21	I.4.1.3(4).	Q 19.62 hy 4.17 or 29.47 fl 0.46 ab 41.92 an 1.67 C 0.82	Marblehead Neck, Essex County, Massachusetts.	T. M. Chatard.	J. H. Sears, B. Mus. Comp. Zool., XVI, p. 170, 1890.	Keratophyre (bostonite).	In W. T., p. 147.
22	I''4''1''3.	Q 14.06 hy 6.70 or 36.14 mt 1.86 ab 37.20 fl 1.22 an 2.78 C 0.20	Rockport, Cape Ann, Essex County, Massachusetts.	H. S. Washington.	H. S. Washington, J. G., VI, p. 795, 1898.	Quartz syenite.	Inclusion in granite, No. 16 above. In W. T., p. 145.
23	I''4.1.3.	Q 22.80 ac 0.46 or 33.36 di 4.71 ab 35.11 hy 1.85 mt 0.93 fl 0.61	South Lynnfield, Massachusetts. c	M. F. Connor.	C. H. Clapp, pers. com., to be publ. in U. S. G. S. B.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
24	76.52	12.30	0.70	0.56	0.16	0.31	5.19	4.58	0.41	0.11	0.12		trace		100.96	
B2. III	1.275	.127	.004	.008	.004	.005	.084	.049			.002		—			
25	75.58	11.17	1.71	1.26	0.04	0.49	4.03	4.68	0.34	0.10	0.22	trace	0.05	ZrO ₂ 0.20	99.87	2.661
A2. II	1.260	.110	.001	.013	.001	.009	.065	.050			.003	—	—			
26	75.08	11.57	2.25	0.93	0.03	0.44	4.21	4.62	0.19	0.04	0.20	trace	trace	ZrO ₂ 0.20	99.76	2.661
A2. II	1.251	.113	.014	.013	.001	.008	.068	.049			.003	—	—			
27	73.93	12.29	2.91	1.55	0.04	0.31	4.66	4.63	0.41		0.18	trace		BaO none	100.91	2.642
A3. III	1.232	.120	.018	.022	.001	.006	.075	.049			.002	—				22°
28	72.97	12.13	2.77	1.09	0.20	0.74	4.61	4.79	0.35	0.10	0.30	0.20	trace	ZrO ₂ 0.20	100.25	
A2. II	1.216	.119	.018	.015	.005	.013	.074	.051			.004	.001				
29	72.88	12.30	1.67	2.10	0.09	0.87	4.43	4.90	0.31	0.15	0.35	trace	0.10	CO ₂ 0.30 ZrO ₂ 0.10	100.55	2.667
A2. II	1.215	.121	.010	.029	.002	.016	.071	.052			.004		.001			20°
30	71.41	12.74	1.75	2.33	0.06	0.85	4.59	5.00	0.56	0.10	0.38	0.22	0.10	CO ₂ 0.40 ZrO ₂ 0.10	100.59	2.66
A2. II	1.190	.125	.011	.032	.002	.015	.074	.053			.005	.002	.001			20°
31	76.81	10.57	none	3.74	0.05	0.32	3.42	5.30	0.25	none			0.13	Li ₂ O none	100.59	
A3. III	1.280	.004	—	.052	.001	.006	.055	.056					.002			
32	76.94	12.59	1.37	0.14	0.25	trace	3.56	5.33	0.22	none	0.08	none	trace	CO ₂ none	100.40	
A2. II	1.282	.123	.009	.002	.006	—	.057	.056			.001	—	—			
33	72.47	14.73	0.96	0.97	trace	0.81	3.69	5.61	0.72			0.04		CO ₂ 0.10	100.10	
A2. II	1.208	.144	.006	.014	—	.014	.060	.060				—				
34	72.06	14.83	1.28	0.64	0.13	1.20	4.31	5.64	0.65				trace	S 0.12	100.86	2.640
B3. IV	1.201	.145	.008	.009	.003	.021	.069	.060								
35	68.96	15.25	3.28	none	0.20	0.76	5.45	5.01	0.91				0.23		100.05	
A3. III	1.149	.150	.021	—	.005	.014	.088	.053					.003			
36	68.50	14.69	1.34	3.25	0.26	2.20	3.50	5.90	0.42			0.03	0.10	BaO 0.05	100.22	
A2. II	1.142	.144	.008	.045	.007	.039	.056	.063				—	.001			
37	76.00	13.11	0.92	n. d.	0.27	1.06	3.88	4.69	0.31						100.24	
A4. IV	1.267	.128	.006	(.012)	.007	.019	.063	.050								
38	75.89	14.02	0.71	n. d.	0.12	0.70	3.64	5.56	0.28						100.92	
A4. IV	1.265	.137	.004	(.008)	.003	.013	.059	.060								
39	75.16	13.74	0.91	n. d.	0.17	0.91	3.76	5.05	0.32						100.02	
A4. IV	1.253	.135	.006	(.012)	.004	.016	.061	.053								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOPASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
24	I.4.1.3(4).	Q 28.80 ac 1.85 or 27.24 ns 0.24 ab 40.87 di 1.18 hy 0.60 il 0.30	Neponset Valley, Massachusetts.	W. T. Hall.	F. Bascom, J. Ac. N. Sci. Phil., (2), XV, p. 135, 1912.	Microgranite.	
25	I''.(3)4.1.3.	Q 33.54 ac 2.31 or 27.80 di 2.20 ab 31.44 hy 0.13 Z 0.37 mt 1.39 il 0.46	West Quincy, Massachusetts.	C. H. Warren.	C. H. Warren, Proc. Am. Acad., XLIX, p. 227, 1913.	Granite.	
26	I.(3)4.1.3''.	Q 32.76 ac 1.85 or 27.24 di 0.22 ab 33.54 wo 0.31 Z 0.37 mt 2.32 il 0.46	n. Common Hill, Quincy, Massachusetts.	C. H. Warren.	C. H. Warren, Proc. Am. Acad., XLIX, p. 227, 1913.	Granite.	
27	I''4.1.3''.	Q 28.98 ac 1.85 or 27.24 di 1.46 ab 37.20 hy 0.13 mt 3.25 il 0.30	Hardwicke Quarry, Quincy, Massachusetts.	H. S. Washing- ton.	H. S. Washington, A. J. S., VI, p. 181, 1898.	Granite.	In W. T., p. 145.
28	I''4.1.3''.	Q 27.42 ac 2.77 or 28.36 di 2.35 ab 35.63 hy 0.50 Z 0.37 mt 0.46 il 0.61 ap 0.34	Rattlesnake Hill, Blue Hills, Massachusetts.	C. H. Warren.	C. H. Warren, Pr. Am. Acad., XLIX, p. 227, 1913.	Granite.	
29	I''4.1.3''.	Q 26.82 ac 0.92 or 28.91 di 3.91 ab 36.15 hy 0.26 mt 1.86 il 0.61	Rattlesnake Hill, Blue Hills, Massachusetts.	C. H. Warren.	C. H. Warren, Pr. Am. Acad., XLIX, p. 260, 1913.	Granite porphyry.	
30	I''4.1.3''.	Q 24.24 ac 0.92 or 29.47 di 1.95 ab 37.73 hy 1.55 mt 2.09 il 0.76 ap 0.67	Ruggles Creek, Quincy, Massachusetts.	C. H. Warren.	C. H. Warren, Pr. Am. Acad., XLIX, p. 235, 1913.	Granite.	
31	I''(3)4.1.3.	Q 34.98 ac 3.23 or 31.14 di 1.49 ab 25.15 hy 4.32	East Greenwich, Rhode Island.	J. H. Perry.	Emerson and Perry, U. S. G. S. B. 311, p. 66, 1907.	Microgranite.	
32	I.(3)4.1.3.	Q 35.88 hy 0.60 or 31.14 mt 0.23 ab 29.87 il 0.15 C 1.02 hm 1.28	Ledyard, Connecticut.	G. F. Loughlin.	G. F. Loughlin, U. S. G. S. B. 492, p. 123, 1912.	Alaskite.	
33	I.4.1(2).3.	Q 27.12 hy 1.06 or 33.36 mt 1.39 ab 31.44 an 3.89 C 1.02	Lighthouse Point, New Haven, Connecticut.	F. Ward.	F. Ward, A. J. S., XXVIII, p. 137, 1909.	Granite.	
34	I.4.1(2).3.	Q 23.10 di 1.11 or 33.36 mt 1.86 ab 36.16 an 4.45	Stony Creek, Connecticut.	H. T. Vulté.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	In W. T., p. 147.
35	I.4''1.3(4).	Q 16.26 di 1.30 or 29.47 hy 0.26 ab 46.11 hm 3.28 an 2.50	Rand Hill, Beek- mantown, Clinton County, New York.	E. W. Morley.	H. P. Cushing, B. G. S. A., IX, p. 248, 1898.	Quartz, syenite porphyry.	In W. T., p. 147.
36	I.4.1(2).3.	Q 19.14 di 3.41 or 35.03 hy 3.93 ab 29.34 mt 1.86 an 6.95	Altamont, Franklin County, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R. LIV, p. R 69, (1900), 1902.	Quartz- augite syenite.	
37	I''4.1.3.	Q 32.16 d 0.92 or 27.80 hy 1.82 ab 33.01 an 4.17	Lithonia, De Kalb County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 213, 1901.	Granite gneiss.	
38	I''4.1(2).3.	Q 30.84 hy 1.36 or 33.36 ab 30.92 an 3.61 C 0.51	Snellville, Gwinnett County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A., p. 145, 1902.	Granite.	
39	I''4.1(2).3.	Q 31.26 hy 1.98 or 26.47 ab 31.96 an 4.45 C 0.51	Lithonia, De Kalb County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A., p. 145, 1902.	Granite gneiss.	Also in A. G., XXVII, p. 213, 1901.

CLASS I. PERSALANE—Continued.

RANG I. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
40	74.96	13.71	0.90	n. d.	0.24	1.02	4.68	4.79	0.44						100.74	
A4. IV	1.249	.134	.006	(.012)	.006	.018	.076	.051								
41	74.30	14.73	0.78	n. d.	trace	0.90	4.61	4.52	0.21		none	trace	trace	BaO SrO none none	100.05	
A3. III	1.238	.144	.005	(.010)	—	.016	.074	.048			—	—	—			
42	72.56	14.81	0.94	n. d.	0.20	1.19	4.94	5.30	0.70						100.64	2.684
A4. IV	1.209	.145	.006	(.012)	.005	.021	.080	.056								
43	73.95	14.23	1.29	n. d.	0.23	1.07	4.61	5.29	0.25						100.92	
A4. IV	1.233	.139	.008	(.016)	.006	.019	.074	.056								
44	71.20	15.46	1.17	n. d.	0.33	1.36	4.96	5.30	0.52						100.30	
A4. IV	1.187	.151	.007	(.014)	.008	.024	.080	.056								
45	70.38	16.47	1.17	n. d.	0.31	1.72	4.98	5.62	0.31						100.96	
A4. IV	1.173	.161	.007	(.014)	.008	.030	.081	.060								
46	70.03	15.62	1.31	n. d.	0.52	2.45	4.82	5.42	0.77						100.94	2.666
A4. IV	1.167	.153	.008	(.016)	.013	.044	.077	.057								
47	72.17	14.44	1.02	0.99	0.70	0.69	3.65	4.84	n. d.						98.77	
A3. III	1.203	.142	.006	.014	.018	.012	.059	.051								
48	73.70	12.87	3.76	0.31	0.11	0.14	3.63	4.56	0.57			trace	0.07		99.84	
A3. III	1.228	.126	.024	.004	.003	.002	.058	.049				—	.001			
49	72.42	13.04	0.68	2.49	0.58	0.66	3.44	4.97	1.21		0.40	0.20	0.09	Cl BaO Li ₂ O trace 0.15 trace	100.37	2.620
A2. II	1.207	.128	.004	.035	.015	.012	.055	.053			.005	.001	.001			
50	72.35	13.78	1.87	0.36	0.42	0.87	4.44	4.49	0.54	0.22	0.44	0.13	0.06	NiO 0.20	99.87	
A2. II	1.206	.135	.012	.005	.010	.016	.071	.048			.006	.001	.001			
51	71.88	12.88	3.05	1.05	0.33	1.13	4.21	4.46	0.26	0.17	0.22	0.15	trace	NiO 0.02	99.81	
A2. II	1.198	.126	.019	.015	.008	.020	.068	.048			.003	.001				
52	71.33	12.55	3.75	0.85	0.58	0.94	4.52	4.20	0.30	0.12	0.55	0.16	0.04	NiO 0.15	100.04	
A2. II	1.189	.123	.024	.012	.015	.017	.072	.045			.007	.001	—			
53	74.14	12.97	1.07	1.20	trace	0.48	4.61	5.30	0.19	0.12	0.25	trace	0.03	S trace	100.36	
A2. II	1.236	.127	.007	.017	—	.009	.074	.056			.003	—	—			
54	73.61	11.97	2.34	1.51	0.19	1.38	3.76	4.32	0.35	0.32	0.46	0.15	0.09	CO ₂ ZrO ₂ BaO SrO none none 0.04 0.02	100.51	
A1. I	1.227	.117	.015	.021	.005	.025	.061	.046			.006	.001	.001			
55	75.90	12.07	1.01	1.45	0.22	0.65	3.08	5.32	0.41	0.06	0.38	0.15		CO ₂ none	100.70	
A2. II	1.265	.118	.006	.020	.006	.012	.050	.056			.005	.001				

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
40	I.4.1.3(4).	Q 26.64 di 2.60 or 28.36 hy 0.86 ab 39.82 an 1.95	Franklin, Heard County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 67, 1902.	Granite.	
41	I.4.1(2).3(4).	Q 27.84 hy 1.32 or 26.69 ab 38.77 an 4.45 C 0.61	Stone Mountain, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 276, 1902.	Aplite.	Also in J. G., X, p. 188, 1902.
42	I.4.1.3''.	Q 20.76 di 2.85 or 31.14 hy 0.63 ab 41.92 an 2.50	Stone Mountain, Georgia.	T. L. Watson.	T. L. Watson, A. G. XXVII, p. 216, 1901.	Granite.	Also in Ga. G. S. B. 9 A, p. 117, 1902.
43	I.4.1''3.	Q 24.18 di 2.38 or 30.02 hy 1.49 ab 38.77 an 2.50	Near Newnan, Coweta County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 95, 1902.	Granite gneiss.	
44	I.4.1(2).3''.	Q 18.60 di 2.03 or 31.14 hy 1.56 ab 41.92 an 4.17	Covington, Newton County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 163, 1902.	Granite gneiss.	
45	I.4''1(2).3''.	Q 14.70 di 4.97 or 33.36 ab 42.44 an 5.56	Elberton, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 203, 1901.	Granite.	Also in Ga. G. S. B. 9 A, p. 215, 1902.
46	I.4''1(2).3(4).	Q 16.26 di 5.82 or 31.69 hy 0.50 ab 40.35 an 5.28	Lexington, Oglethorpe County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 203, 1901.	Granite.	Also in Ga. G. S. B. 9 A, p. 189, 1902.
47	I''4.1(2).3.	Q 29.76 hy 2.46 or 28.47 mt 1.93 ab 30.92 il 0.46 an 3.34 C 2.04	Felch Mountain, Michigan.	H. N. Stokes.	H. L. Smyth, U. S. G. S. Mon. 36, p. 389, 1899.	Granite.	Low sum due to H ₂ O. In W. T., p. 147.
48	I.(3)4.1.3.	Q 34.74 hy 0.30 or 27.24 mt 1.16 ab 30.39 hm 3.04 an 0.56 C 1.73	Little Brick Island, Pigeon Point, Minnesota.	L. G. Eakins.	W. S. Bayley, U. S. G. S. B. 109, p. 58, 1893.	Quartz kerato- phyre.	In W. T., p. 147.
49	I''4.1''3.	Q 30.06 hy 5.06 or 28.47 mt 0.93 ab 28.82 il 0.76 an 2.22 C 1.22	Pigeon Point, Minnesota.	W. F. Hille- brand.	W. S. Bayley, A. J. S., XXXVII, p. 59, 1889.	Soda granite.	Also in U. S. G. S. B. 109, p. 56, 1893. In W. T., p. 147.
50	I.4.1(2).3''.	Q 27.30 hy 1.10 or 26.69 il 0.76 ab 37.20 hm 1.87 an 3.61 ap 0.34 C 0.31	Near Ironton, Missouri.	W. H. Mel- ville.	E. Haworth, Mo. G. S. A. R. VIII, p. 213, 1895.	Quartz porphyry.	In W. T., p. 147.
51	I''4.1(2).3''.	Q 28.02 di 1.51 or 26.69 hy 0.10 ab 35.63 mt 2.78 an 2.78 hm 1.12 ap 0.34	Near Ironton, Missouri.	W. H. Mel- ville.	E. Haworth, Mo. G. S. A. R. VIII, p. 213, 1895.	Quartz porphyry.	In W. T., p. 147.
52	I''4.1''3(4).	Q 26.82 di 0.65 or 25.02 hy 1.20 ab 37.73 mt 1.16 an 3.06 il 1.06 hm 3.04 ap 0.34	Near Ironton, Missouri.	W. H. Mel- ville.	E. Haworth, Mo. G. S. A. R. VIII, p. 213, 1895.	Quartz porphyry.	In W. T., p. 147.
53	I.4.1.3.⊙	Q 26.58 ac 1.39 or 31.14 di 2.23 ab 37.20 hy 0.13 mt 0.93 il 0.46	Mountain Park, Oklahoma.	Fairchild.	C. H. Taylor, U. S. G. S. rec. lab.	Granite.	
54	I''4.1''3''.	Q 32.82 di 1.30 or 25.58 wo 0.70 ab 31.96 mt 3.48 an 2.78 il 0.91 ap 0.34	Near Mount Sheri- dan, Wichita Mountains, Okla- homa.	G. Steiger.	J. P. Iddings, U. S. G. S. B. 419, p. 41, 1910.	Granite.	
55	I.(3)4.1''3.	Q 35.76 hy 1.79 or 31.14 mt 1.39 ab 26.20 il 0.76 an 2.50 ap 0.34 C 0.31	Llano, Texas.	H. S. Washing- ton.	J. P. Iddings, J. G., XII, p. 228, 1904.	Quartz porphyry.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
56	76.30	11.53	1.83	0.76	0.03	0.16	4.01	4.70	0.34	0.19	0.16	none	trace	CO ₂ trace ZrO ₂ 0.11 S trace BaO none SrO none Ce ₂ O ₃ 0.02	100.14	2.602
A1. I	1.272	.113	.011	.011	.001	.003	.065	.050			.002	—	—			
57	75.12	10.94	2.88	0.86	0.07	0.20	4.46	4.54	0.19	0.18	0.20	none	0.08	CO ₂ 0.04 ZrO ₂ 0.13 S trace BaO none SrO 0.05 Ce ₂ O ₃ none	99.98	2.617
A1. I	1.252	.107	.018	.012	.002	.004	.072	.048			.003	—	.001			
58	74.85	12.83	1.40	0.37	0.04	0.48	4.24	5.12	0.30	0.24	0.15		trace	ZrO ₂ 0.09 S trace BaO none SrO none Ce ₂ O ₃ 0.07	100.18	2.611
A1. I	1.248	1.248	.009	.005	.001	.009	.068	.054			.002		—			
59	72.86	11.74	2.71	1.66	0.06	0.24	4.63	4.92	0.40	0.51	0.20	trace	0.07	CO ₂ trace ZrO ₂ 0.28 S trace BaO none SrO none Ce ₂ O ₃ 0.05	100.33	2.635
A1. I	1.214	.115	.017	.023	.002	.004	.074	.052			.003	—	.001			
60	68.25	13.60	3.66	1.43	0.02	0.54	6.52	4.73	0.32	0.16	0.26	0.02	0.04	CO ₂ trace ZrO ₂ 0.25 S trace BaO trace SrO trace Ce ₂ O ₃ 0.08	99.88	2.648
A1. I	1.138	.133	.023	.019	—	.010	.105	.050			.003	—	—			
61	73.35	14.38	1.96	0.34	0.09	0.26	4.33	5.66								100.37
A3. III	1.223	.141	.012	.005	.002	.005	.070	.060								
62	68.71	13.45	5.31	0.75	0.19	0.96	4.63	5.51	0.36	0.13	0.21	0.04	0.14	SO ₃ 0.05 BaO none SrO none Li ₂ O none	100.44	
A1. I	1.145	.132	.033	.010	.005	.017	.075	.059			.003	—	.002			
63	75.30	11.95	2.17	n. d.	0.05	0.62	3.09	4.96	0.61	0.36	0.17	trace	trace	CO ₂ none SO ₃ 0.44 Cl trace BaO trace SrO trace Org. 0.45	100.17	
A2. II	1.255	.117	.014	(.028)	.001	.011	.050	.054			.002	—	—			
64	74.90	13.64	0.66	.050	trace	0.61	4.22	4.64	0.33		0.15		trace			99.65 2.61
A3. III	1.248	.134	.004	.007	—	.011	.068	.049			.002		—			
65	74.82	13.80	0.37	0.30	0.10	0.17	4.33	4.81	0.83		0.25		trace	Li ₂ O trace	99.78	2.59
A3. III	1.247	.135	.002	.004	.003	.003	.070	.051			.003		—			
66	72.88	12.90	0.74	1.05	0.75	0.81	3.72	5.03	1.22		0.45		0.05			99.60 2.64
A2. II	1.215	.126	.005	.015	.019	.014	.060	.054			.006		—			
67	72.48	13.14	1.66	1.02	0.15	1.04	4.22	4.88	0.42		0.32		trace			99.33 2.62
B3. IV	1.208	.129	.010	.014	.004	.019	.068	.052			.004		—			
68	72.38	14.71	1.09	0.82	0.70	0.67	4.28	4.15	0.92		0.10		trace	Li ₂ O trace	99.82	2.61
A3. III	1.206	.144	.007	.011	.018	.012	.069	.044			.001		—			
69	71.67	15.82	1.18	0.35	0.13	0.25	4.46	4.45	1.21		0.10		trace	Li ₂ O trace	99.62	2.60
A3. III	1.195	.155	.007	.005	.003	.004	.072	.047			.001		—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
56	I.(3)4.1.3.	Q 34.92 ac 0.92 or 27.80 di 0.22 ab 33.01 wo 0.23 mt 2.09 il 0.30	Chisos Mountain, Trans-Pecos, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 228, p. 74, 1904.	Rhyolite.	
57	I''(3)4.1.3.	Q 32.82 ac 6.01 or 26.69 di 0.96 ab 30.92 hy 0.36 mt 1.16 il 0.46	Shafter, Trans- Pecos, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 228, p. 74, 1904.	Rhyolite.	
58	I''4.1.3.	Q 30.12 di 0.22 or 30.02 wo 0.46 ab 35.63 mt 0.70 an 1.11 il 0.30 hm 0.96	Chisos Mountain, Trans-Pecos, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 228, p. 74, 1904.	Rhyolite.	
59	I(II)4.1.3.	Q 27.48 ac 5.08 or 28.91 di 0.99 ab 33.01 hy 1.78 mt 1.39 il 0.46	West of Paisano Mountain, Trans- Pecos, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 228, p. 74, 1904.	Rhyolite.	
60	I(II)4''1.3(4).	Q 14.52 ac 10.16 or 27.80 wo 1.16 ab 43.49 mt 0.23 il 0.46	North of Chisos Mountain, Trans- Pecos, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 228, p. 75, 1904.	Grogrudite.	
61	I.4.1.3.⊙	Q 25.86 hy 0.20 or 33.36 mt 1.16 ab 36.68 hm 1.12 an 1.39 C 0.61	Mosquez Canyon, Apache Moun- tains, Trans- Pecos, Texas.	A. Osann.	A. Osann, T. M. P. M., XV, p. 439, 1895.	Paisanite.	In W. T., p. 147.
62	I''4.1.3.	Q 19.38 ac 0.92 or 32.80 di 1.08 ab 38.25 wo 1.39 mt 2.09 il 0.46 hm 3.04	Vieja Mountains, San Carlos, Presidio County, Texas.	G. Steiger.	E. C. E. Lord, U. S. G. S. B. 164, p. 92, 1900.	Quartz pantelle- rite.	In W. T., p. 147.
63	I.(3)4.1''3.	Q 34.92 hy 3.53 or 30.02 il 0.30 ab 26.20 an 3.06 C 0.20	Red Mountain, Rimini, Butte District, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. B. 168, p. 119, 1900.	Rhyolite.	In W. T., p. 149.
64	I''4.1''3''.	Q 31.38 hy 0.13 or 27.24 mt 0.93 ab 35.63 il 0.30 an 3.06 C 0.61	Fourmile Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 120, 1896.	Rhyolite.	In W. T., p. 147.
65	I''4.1.3''.	Q 30.72 hy 0.30 or 28.36 mt 0.23 ab 36.68 il 0.46 an 0.83 hm 0.16 C 1.12	Fourmile Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 101, 1896.	Quartz-tour- maline porphyry.	In W. T., p. 147.
66	I.4.1(2).3.	Q 28.02 di 0.43 or 30.02 hy 2.23 ab 31.44 mt 1.16 an 3.33 il 0.91	Between Black- hawk and Robinson, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 96, 1896.	Aplitic granite.	In W. T., p. 149.
67	I.4.1''3''.	Q 27.36 di 0.96 or 28.91 wo 0.70 ab 35.63 mt 2.32 an 2.50 il 0.61	Elk Peak, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 84, 1896.	Granite.	In W. T., p. 149.
68	I.4.1(2).3(4).	Q 28.98 hy 2.50 or 24.46 mt 1.62 ab 36.16 il 0.15 an 3.34 C 1.94	Between Fourmile and Checker- board creeks, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 99, 1896.	Quartz porphyry.	In W. T., p. 149.
69	I.4.1.3(4).	Q 28.20 hy 0.30 or 26.13 mt 0.93 ab 37.73 il 0.15 an 1.11 hm 0.48 C 3.26	Musselshell River, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 103, 1896.	Quartz porphyry.	In W. T., p. 149.

CLASS I. PERSALANE—Continued.

RANG I. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
70	68.65	18.31	0.56	0.08	0.12	1.00	4.86	4.74	0.83	0.27	0.20	trace	trace	SO ₃ trace Cl 0.03 F trace BaO 0.13 SrO 0.10	99.88	
A1. I	1.144	.180	.003	.001	.003	.018	.078	.050			.003	—	—			
71	68.34	15.32	1.90	0.84	0.54	0.92	5.45	5.62	0.30	0.15	0.21	0.13	0.07	Cl 0.04 F none BaO 0.08 SrO 0.04 Li ₂ O none	99.95	
A1. I	1.139	.150	.012	.012	.014	.016	.089	.080			.003	.001	.001			
72	75.71	11.11	1.56	0.37	0.08	0.88	4.64	4.18	0.35		1.25		0.07		100.20	
A2. II	1.282	.109	.010	.005	.002	.016	.075	.045			.016		.001			
73	70.92	13.24	3.54	0.66	0.23	1.42	4.28	4.25	0.57		0.16	0.18	0.14	Li ₂ O none	100.59	
A2. II	1.181	.130	.022	.010	.006	.025	.069	.046			.002	.001	.002			
74	75.62	12.96	1.00	0.31	0.03	0.39	3.80	5.20	0.48	0.29	0.21	none	0.04	CO ₂ none ZrO ₂ 0.02 S 0.01 BaO 0.01 SrO none	100.37	
A1. I	1.260	.127	.006	.004	.001	.007	.061	.055			.003	—	—			
75	75.19	12.91	0.88	0.68	none	0.68	3.72	5.30	0.47	0.21	0.18	none	0.03	CO ₂ 0.11 S trace BaO none	100.36	
A2. II	1.253	.127	.006	.009	—	.012	.060	.056			.002	—	—			
76	74.45	14.72	none	0.56	0.37	0.83	3.97	4.53	0.66			0.01	0.28	Li ₂ O trace	100.38	
A2. II	1.241	.144	—	.008	.009	.914	.064	.048				—	.004			
77	74.27	13.67	0.48	0.45	0.12	0.65	3.48	5.90	0.04	0.10	0.49	0.04	none	ZrO ₂ 0.01 Cl 0.02	99.72	
A2. II	1.238	.134	.003	.006	.003	.012	.056	.063			.006	—	—			
78	73.82	10.59	2.18	2.98	0.04	0.28	4.20	4.57	0.49	0.39	0.13	0.02	none	ZrO ₂ none F 0.06 S none BaO none	99.75	
A1. I	1.230	.104	.014	.042	.001	.005	.068	.049			.002	—	—			
79	73.22	10.93	3.94	1.20	none	0.41	3.63	4.59	0.99	0.87	0.22	none	0.03	ZrO ₂ none F 0.10 S none BaO none	100.13	
A1. I	1.220	.107	.025	.017	—	.007	.058	.049			.003	—	—			
80	73.51	13.28	0.94	0.97	0.05	1.11	3.79	5.22	0.62	0.16	0.18	trace	trace	F 0.55 BaO trace SrO none Li ₂ O trace	100.38	
A2. II	1.225	.130	.006	.014	.001	.020	.061	.056			.002	—	—			
81	75.17	12.66	0.23	1.40	0.05	0.83	2.88	5.75	0.62	0.16	0.10	0.03	trace	F 0.31 BaO 0.03 Li ₂ O trace	100.26	
A2. II	1.253	.124	.001	.019	.001	.014	.047	.062			.001	—	—			
82	71.56	13.10	0.66	0.28	0.14	0.74	3.77	4.06	5.52				0.16		99.99	
A3. III	1.193	.128	.004	.004	.004	.012	.061	.043					.002			
83	70.73	14.22	1.59	0.59	none	0.72	4.96	5.57	0.32	1.16	0.34	0.03	0.11	ZrO ₂ 0.04 SO ₃ none BaO 0.01	100.39	
A1. I	1.179	.139	.010	.008	—	.013	.080	.060			.004	—	.002			
84	69.89	17.94	0.39	0.52	0.14	trace	4.21	4.38	2.07			trace	0.23		99.77	2.602
A3. III	1.165	.176	.002	.007	.004	—	.068	.047				—	.003			
85	67.41	16.23	0.85	1.14	0.15	0.14	3.95	7.19	0.88	0.67	0.16	0.05	0.16	CO ₂ 0.56 ZrO ₂ 0.11 Cl none S trace BaO trace SrO none	99.65	
A1. I	1.124	.159	.005	.016	.004	.003	.064	.077			.002	—	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
70	I.4.1(2).3(4).	Q 20.20 hy 0.30 or 27.80 il 0.15 ab 40.87 hm 0.56 an 5.00 ru 0.16 C 3.47	Antoine Butte, Little Rocky Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, J. G., IV, p. 414, 1896.	Quartz syenite porphyry.	In W. T., p. 147.
71	I.4(5).1.3(4).	Q 13.14 di 2.81 or 33.36 mt 2.32 ab 46.64 il 0.46 hm 0.32	Beaver Creek Stock, Bearpaw Moun- tains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., I, p. 354, 1896.	Quartz syenite.	In W. T., p. 147.
72	I''.(3)4.1.3''.	Q 32.58 ac 4.62 or 25.02 di 0.65 ab 34.06 wo 0.23 il 0.76 tn 2.16	Great Paint Pots, Yellowstone National Park.	F. A. Gooch.	J. P. Iddings, U. S. G. S. B. 148, p. 131, 1897.	Rhyolite.	In W. T., p. 149.
73	I.4.1(2).3(4).	Q 27.12 di 1.30 or 25.58 mt 0.12 ab 36.16 mt 2.32 an 4.17 il 0.30 hm 1.92 ap 0.34	Upper Geyser Basin, Yellow- stone National Park.	F. A. Gooch.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 426, 1899.	Rhyolite.	In W. T., p. 149.
74	I.''4.1.3.	Q 32.94 hy 0.10 or 30.58 mt 0.23 ab 31.96 il 0.46 an 1.95 hm 0.80 C 0.41	Big Spring Creek, San Cristobal quadrangle, Colorado.	R. C. Wells.	W. Cross, U. S. G. S. rec. lab.	Rhyolite.	
75	I.''4.1''3.	Q 32.10 di 0.25 or 31.14 mt 1.39 ab 31.44 il 0.30 an 3.06	Alpine Gulch, San Cristobal quadrangle, Colorado.	R. C. Wells.	W. Cross, U. S. G. S. rec. lab.	Granite porphyry.	
76	I.4.1(2).3.	Q 31.20 hy 2.48 or 26.69 ab 33.54 an 3.89 C 1.84	Chalk Mountain, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. Mon. 12, p. 349, 1886.	Nevadite.	In W. T., p. 149.
77	I.4.1(2).3.	Q 29.82 hy 0.30 or 35.03 il 0.91 ab 29.34 hm 0.48 an 3.34 C 0.31	Browns Gulch, Monarch District, Colorado.	R. M. Butters.	R. D. Crawford, Colo. G. S. B. 4, p. 154, 1913.	Granite.	
78	I(II).(3)4.1.3.	Q 30.72 ac 6.01 or 27.74 di 0.75 ab 28.82 hy 4.72 mt 0.23 il 0.30	Rosemount, Colorado Springs quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. B. 419, p. 100, 1910.	Riebeckite granite.	
79	I.(3)4.1.3.	Q 34.28 wo 0.81 or 27.24 mt 3.25 ab 30.39 il 0.46 hm 1.76	Fairview, Colorado Springs quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. B. 419, p. 100, 1910.	Mica granite.	
80	I.4.'(2).3.	Q 28.98 di 1.70 or 31.14 mt 1.39 ab 31.96 il 0.30	Middle Beaver Creek, Pikes Peak, Colorado.	W. F. Hille- brand.	E. B. Mathews, J. G., VIII, p. 237, 1900.	Granite.	In W. T., p. 149.
81	I.(3)4.1(2).''3.	Q 33.18 hy 2.34 or 34.47 mt 0.23 ab 24.63 il 0.15 an 3.89 C 0.10	Colorado Springs Waterworks, Pikes Peak, Colorado.	W. F. Hille- brand.	E. B. Mathews, J. G., VIII, p. 237, 1900.	Granite.	In W. T., p. 149.
82	I.(3)4.1(2).3''.	Q 32.34 hy 0.56 or 23.91 mt 0.92 ab 31.96 an 3.34 C 1.22	Fleetwood Tunnel, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, (II), p. 320, 1896.	Pitchstone.	In W. T., p. 149.
83	I.4.1.3''.	Q 19.68 ac 0.46 or 33.36 wo 1.51 ab 41.39 mt 1.39 il 0.61 hm 0.48	Grayrock Peak, Engineer Moun- tain quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. Fol. 171, p. 10, 1910.	Quartz trachyte.	
84	I.4.1.3''.	Q 27.78 hy 1.46 or 26.13 mt 0.46 ab 35.63 C 6.22	Arkansas River, Nathrop, Colorado.	L. G. Eakins.	W. Cross, Pr. Colo. Sc. Soc., II, p. 69, 1887.	Rhyolite.	In W. T., p. 149.
85	I.4''1.3.	Q 15.42 hy 1.85 or 42.81 mt 1.16 ab 33.54 il 0.30 an 0.83 C 1.53	Idaho Springs, Colorado.	W. T. Schaller.	S. H. Ball, U. S. G. S. P. P. 63, p. 134, 1908.	Bostonite porphyry.	

CLASS I. PERSALANE—Continued.

RANG I. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
86	73.27	13.29	1.16	0.13	0.07	0.21	3.44	7.53	0.43	0.23	0.10	trace	0.03	CO ₂ 0.02 ZrO ₂ 0.02 SO ₃ 0.07 Cl 0.01 S none	100.11	
A1. I	1.221	.130	.007	.002	.002	.004	.055	.080			.001	—	—			
87	70.17	11.83	0.93	none	0.06	0.76	3.85	3.74	8.72		0.17				100.23	2.25
A3. III	1.170	.116	.006	—	.002	.013	.062	.040			.002					23.5°
88	70.02	14.38	1.17	0.13	0.61	0.66	5.48	5.87	0.44	0.27	0.10	trace	0.02	CO ₂ 0.38 ZrO ₂ 0.01 SO ₃ 0.19 Cl 0.03 BaO 0.13 SrO 0.06 Li ₂ O trace	99.95	
A1. I	1.167	.141	.008	.002	.015	.012	.089	.063			.001	—	—			
89	76.20	13.17	0.34	0.73	0.19	0.42	4.31	4.46	0.33				0.10		100.25	
A3. III	1.270	.129	.002	.010	.005	.007	.069	.048					.001			
90	75.86	12.17	0.85	0.36	none	0.62	3.60	5.04	0.72	0.27	0.21	trace	none		99.70	
A2. II	1.264	.119	.005	.005	—	.011	.058	.053			.003	—	—			
91	74.02	13.20	0.75	0.29	0.06	0.56	4.18	4.82	1.86		0.02		trace	Cl trace	99.76	
A2. II	1.234	.129	.005	.004	.002	.010	.068	.051			—		—			
92	76.30	12.50	1.47	n. d.	none	0.17	3.86	4.67	0.32	0.18	0.05	trace	trace	CO ₂ none BaO 0.07 SrO none Li ₂ O none	99.59	
A2. II	1.272	.122	.009	(.018)	—	.003	.062	.050			—	—	—			
93	73.12	14.35	1.41	0.80	0.40	0.28	4.60	4.31	1.11	0.09	0.13	0.06			100.66	
A2. II	1.219	.141	.009	.011	.010	.005	.074	.045			.002	—				
94	75.78	12.39	0.22	1.25	0.31	0.81	4.00	4.64	0.41						99.81	
A3. III	1.263	.121	.001	.018	.008	.014	.064	.050								
95	74.05	13.85	trace	—	0.07	0.90	4.60	4.31	2.20						99.98	
A3. III	1.234	.136	—	—	.002	.016	.074	.046								
96	74.01	12.95	n. d.	1.42	0.48	1.00	5.34	4.65	0.29		0.24	0.01	trace	Cl 0.07	100.46	
A3. III	1.234	.127	(.008)	.003	.012	.018	.085	.050			.003	—	—			
97	74.74	15.38	n. d.	0.77	0.03	0.26	4.20	4.26	0.58				0.04		100.26	
A3. III	1.246	.151	—	.011	.001	.005	.068	.046					—			
98	72.80	15.07	0.26	0.21	none	none	3.35	7.92	0.30				trace		99.91	
A3. III	1.213	.148	.002	.003	—	—	.054	.084					—			
99	75.70	13.33	0.40	0.06	0.06	0.55	3.19	5.39	1.17	0.31	0.02	0.07	trace	CO ₂ none S 0.05 BaO 0.04	100.34	
A1. I	1.262	.131	.003	.001	.002	.010	.052	.057			—	—	—			
100	74.30	13.29	1.15	0.10	0.09	0.85	3.75	4.83	0.50	0.91	0.20	0.07	trace	CO ₂ none S 0.03 BaO none	100.07	
A1. I	1.238	.130	.008	.001	.002	.015	.061	.051			.003	—	—			
101	74.00	13.48	1.73	0.06	0.13	0.63	4.63	5.12	0.15	0.11	0.16	0.06	trace	CO ₂ trace ZrO ₂ 0.04 S trace BaO 0.05 SrO none Li ₂ O trace	100.35	
A1. I	1.233	.131	.011	.001	.003	.011	.074	.054			.002	—	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
86	I.4.1.(2)3.	Q 24.99 ac 2.31 or 44.48 di 0.43 ab 28.20 wo 0.23 mt 0.23 il 0.15 hm 0.16	Mount Waas, La Sal Moun- tains, Utah.	W. F. Hille- brand.	L. M. Prindle, U. S. G. S. B. 228, p. 191, 1904.	Aegirite granite porphyry.	
87	I.(3)4.1(2).3(4).	Q 31.80 hy 0.20 or 22.24 hm 0.93 ab 32.48 ru 0.17 an 3.61 C 0.10	Near Marysvale, Utah.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 168, 1900.	Rhyolitic glass.	
88	I''4''.1.3.	Q 15.48 ac 3.70 or 35.03 ns 0.37 ab 40.87 di 2.62 hy 0.40 il 0.15	Mount Waas, La Sal Moun- tains, Utah.	W. F. Hille- brand.	L. M. Prindle, U. S. G. S. B. 228, p. 191, 1904.	Syenite aplite.	
89	I''4.1.3''.	Q 32.40 hy 1.69 or 26.69 mt 0.46 ab 36.16 an 1.95 C 0.51	Obsidian Hill, Tewan Mountains, New Mexico.	L. G. Eakins.	J. P. Iddings, U. S. G. S. A. R. 7, p. 291, 1888.	Obsidian.	In W. T., p. 149.
90	I.(3)4.1.3.	Q 34.74 di 0.35 or 29.57 mt 0.46 ab 30.39 il 0.46 an 2.22 hm 0.48	Near Bisbee, Arizona.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 21, p. 77, 1904.	Tourmaline granite.	
91	I.4.1''3''.	Q 29.88 hy 0.20 or 28.36 mt 0.93 ab 35.63 hm 0.16 an 2.78	Sugarloaf Hill, San Francisco Mountains, Arizona.	S. H. Clapp.	H. H. Robinson, U. S. G. S. P. P. 76, p. 104, 1913.	Rhyolite.	
92	I''4.1.3.	Q 34.56 hy 2.38 or 27.80 ab 32.49 an 0.83 C 0.71	Chilkoot Pass, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 231, 1900.	Alaskite.	In W. T., p. 149.
93	I.4.1.3(4).	Q 29.10 hy 1.00 or 25.02 mt 2.09 ab 38.77 il 0.50 an 1.39 C 1.73	Taku Arm, Vancouver Island, British Columbia.	M. F. Connor.	D. D. Cairnes, Can. G. S. Mem. 37, p. 68, 1913.	Granite porphyry.	
94	I''4.1.3''.	Q 31.98 di 1.67 or 27.80 hy 2.18 ab 33.54 mt 0.23 an 1.95	Mono Lake, California.	W. H. Melville.	W. Lindgren, U. S. G. S. B. 150, p. 151, 1898.	Rhyolite obsidian.	In W. T., p. 151.
95	I.4.1(2).3(4).	Q 28.80 hy 0.20 or 25.58 ab 38.78 an 4.45	Mono Craters, n. Mono Lake, California.	T. M. Chatard.	I. C. Russell, U. S. G. S. A. R. 8, p. 380, 1888.	Rhyolite.	In W. T., p. 151.
96	I.4.1.3(4).	Q 24.60 ac 3.70 or 27.80 di 2.59 ab 40.35 wo 0.70 il 0.46	Clear Lake, California.	W. H. Melville.	G. F. Becker, U. S. G. S. Mon. 13, p. 154, 1888.	Andesite obsidian.	In W. T., p. 151.
97	I.4''.1.3(4).	Q 32.40 hy 1.55 or 25.58 ab 35.63 an 1.39 C 3.26	Rincon, San Diego County, California.	W. T. Schaller.	W. T. Schaller, U. S. G. S. rec. lab.	Pegmatite.	
98	I.4.1''.3.	Q 23.10 mt 0.46 or 46.70 ab 28.30 C 1.02	Hiriart Hill, San Diego County, California.	W. T. Schaller.	W. T. Schaller, U. S. G. S. rec. lab.	Graphic granite.	
99	I.(3)4.1''3.	Q 35.16 hy 0.20 or 31.69 mt 0.23 ab 27.25 hm 0.32 an 2.78 C 1.22	Cactus Corral, Ralston District, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. B. 228, p. 207, 1904.	Tordrillite.	
100	I''4.1(2).3.	Q 32.40 hy 0.20 or 28.36 il 0.15 ab 31.96 hm 1.15 an 3.34 ru 0.16 C 0.61	Sweetwater, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. B. 228, p. 208, 1904.	Tordrillite.	
101	I.4.1.3''.	Q 26.88 di 0.65 or 30.02 wo 0.58 ab 38.77 il 0.15 an 0.31 hm 1.76 ru 0.05	Meadow Creek Canyon, Nevada.	W. F. Hille- brand.	J. E. Spurr, U. S. G. S. B. 228, p. 208, 1904.	Tordrillite.	

CLASS I. PERSALANE—Continued.

RANG I. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
102	74.67	13.25	1.06	0.18	trace	1.26	3.99	4.62	0.22	0.18	0.07	0.06	none	CO ₂ 0.79 S trace BaO none SrO none	100.35	
A1. I	1.245	.130	.007	.003	—	.022	.065	.049			.001	—	—			
103	73.91	15.29	n. d.	0.89	none	0.77	3.62	4.79	1.19			0.07			100.53	
A3. III	1.232	.150	—	.013	—	.014	.058	.051				—				
104	73.92	12.38	1.62	0.56	0.27	0.33	3.49	5.39	1.69						99.65	2.420
A3. III	1.232	.121	.010	.008	.007	.006	.056	.057								
105	75.23	12.36	0.96	1.24	0.01	1.00	4.00	4.62	0.73			0.27			100.42	
A3. III	1.254	.121	.006	.017	—	.018	.064	.049				.002				
106	71.33	15.35	0.78	0.29	0.45	0.21	3.96	7.16	0.17		0.20	0.01	0.10		100.01	
A2. II	1.180	.150	.005	.004	.011	.004	.064	.077			.003	—	.001			
107	75.87	14.35	0.22	none	0.29	none	3.96	4.65	0.33		trace			SO ₃ 0.23	99.90	
A3. III	1.265	.141	.001		.007	—	.064	.050			—					
108	66.04	16.13	2.81	0.99	0.48	0.61	3.89	6.74	0.92		1.08	0.26	trace	FeS ₂ 0.07	100.02	2.634
A2. II	1.101	.158	.018	.014	.012	.011	.063	.071			.014	.002	—			
109	73.96	13.10	0.74	1.28	0.18	0.70	3.55	5.05	0.93	0.23	trace	0.10	0.04	F 0.08 S 0.04 BaO 0.06 SrO 0.13	100.13	
A1. I	1.233	.128	.005	.018	.005	.013	.057	.054			—	.001	—			
110	76.23	12.91	1.46	0.27	0.10	0.16	4.34	4.03	0.30	0.07	0.12		trace		99.99	
A3. III	1.271	.126	.009	.004	.003	.003	.070	.043			.002					
111	74.75	14.08	1.18	0.85	0.04	0.49	3.09	5.39	0.34			0.12	trace		100.33	
A3. III	1.246	.138	.008	.012	.001	.009	.050	.057				.001				
112	73.80	11.90	1.90	1.91	0.33	0.30	5.05	4.93	0.13	0.04	0.23	trace	0.12	ZrO ₂ 0.04 Ce ₂ O ₃ 0.04	100.72	
A1. I	1.230	.117	.012	.026	.008	.005	.082	.052			.003	—	.002		(100.68)	
113	73.19	12.65	1.04	1.53	0.30	0.55	4.45	5.08	0.38	0.09	0.27	0.24	0.08	F 0.17 FeS ₂ none NiO none BaO none Li ₂ O trace	100.02	
A1. I	1.220	.124	.006	.021	.008	.010	.072	.054			.003	.002	.001			
114	73.12	12.44	2.09	1.65	0.14	0.88	3.90	4.67	0.24	0.25	0.39	0.09	0.17	CO ₂ 0.05 NiO none BaO none	100.08	
A1. I	1.219	.122	.013	.023	.004	.016	.063	.050			.005	—	.002			
115	72.66	12.00	2.03	2.04	0.07	1.25	3.26	5.26	0.47	0.22	0.34	0.04	0.18	CO ₂ 0.24 NiO none BaO 0.12	100.18	
A1. I	1.211	.118	.013	.028	.002	.022	.053	.056			.004	—	.003			
116	71.30	11.24	1.80	2.84	0.61	1.56	3.44	4.66	1.04	0.39	0.58	0.22	0.31	S none NiO none BaO 0.07 Li ₂ O trace	100.06	
A1. I	1.188	.110	.011	.039	.015	.028	.055	.050			.007	.002	.004			
117	71.05	15.36	0.70	0.66	0.25	0.29	3.24	6.18	1.69		0.47		trace	BaO 0.11	100.00	
B2. III	1.184	.151	.004	.009	.006	.005	.052	.066			.006		—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
102	I''4.1(2).3''.	Q 31.38 wo 0.70 or 27.24 mt 0.46 ab 34.06 il 0.15 an 4.45 hm 0.80	Quinn Canyon Range, Nevada.	H. N. Stokes.	J. E. Spurr, J. G., IX, p. 602, 1901.	Rhyolite.	
103	I''4.1(2).3.	Q 32.22 hy 1.72 or 28.36 ab 30.39 an 3.39 C 2.75	Pinto Peak, Eureka District, Nevada.	E. Hart.	A. Hague, U. S. G. S. Mon. 20, p. 264, 1892.	Rhyolite.	Not in W. T.
104	I''4.1.3.	Q 32.10 hy 0.70 or 31.69 mt 1.86 ab 29.34 hm 0.32 an 1.67 C 0.20	Cerro Mercado, Durango, Mexico.	H. W. Nichols.	O. C. Farrington, Field Mus., G. Ser., II, p. 222, 1904.	Rhyolite.	
105	I.(3)4.1''3''.	Q 32.76 di 0.75 or 27.24 hy 1.06 ab 33.54 mt 1.39 an 2.22 ap 0.67	Cerro de los Navajos, Tulancingo, Mexico.	F. Baerwald.	C. A. Tenne, Z. D. G. G., XXXVII, p. 616, 1885.	Obsidian.	In W. T., p. 151.
106	I.4.1.3.⊙	Q 19.44 hy 1.10 or 42.81 mt 0.46 ab 33.54 il 0.46 an 1.11 hm 0.48 C 0.51	Mazaruni River, British Guiana.	Harrison and Reid.	J. B. Harrison, pers. com.	Pegmatite.	Vein in No. 21, I.3.2.3.
107	I.(3)4.1.3.	Q 34.44 hy 0.70 or 27.80 hm 0.22 ab 33.64 C 2.75	Calí, Cauca, Colombia.	J. E. Whitfield.	G. P. Merrill, Pr. U. S. Nat. Mus., XL, p. 484, 1911.	Obsidian.	
108	I.4''1.3.	Q 16.62 hy 1.20 or 39.48 il 2.13 ab 33.01 hm 2.81 an 1.11 ap 0.67 C 2.04	Near Cayaima, Upper Magdalena River, Colombia.	A. Lindner.	E. Lehmann, T. M. P. M., XXX, p. 261, 1911.	Quartz syenite aplite.	3 decimals.
109	I''4.1''3.	Q 31.74 hy 2.22 or 30.02 mt 1.16 ab 29.57 ap 0.34 an 2.78 C 0.71	Santo Antonio, Rio Madeira, Amazonas, Brazil.	G. S. Blake.	J. W. Evans, Q. J. G. S., LX, p. 117, 1906.	Granitite.	
110	I.(3)4.1.(3)4.	Q 35.04 hy 0.30 or 23.91 mt 0.46 ab 36.68 il 0.30 an 0.83 hm 1.12 C 1.12	Loch Croire na Meidhe, Assynt, Scotland.	W. Pollard.	G. S. U. K., Sum. Prog. 1900, p. 157.	Porphyry.	
111	I.(3)4.1.3.	Q 35.22 hy 0.63 or 31.69 mt 1.86 ab 26.20 ap 0.34 an 1.67 C 2.55	Benrinnes, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VIII, (1), p. 54, 1901.	Granite.	
112	I(II).4.1.3.	Q 26.22 ac 5.54 or 28.91 ns 0.61 ab 34.06 di 1.21 hy 3.47 il 0.51	Carn Chinneag, Rossshire, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot. Mem. XCIII, p. 92, 1912.	Aegirite- riebeckite gneiss.	
113	I.4.1.3.⊙	Q 26.64 ac 0.92 or 30.02 di 0.71 ab 36.68 hy 2.15 mt 1.39 il 0.46 ap 0.67	Leaba Bhaltair, Rossshire, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem. XCIII, p. 92, 1912.	Granite gneiss.	
114	I''4.1''3.	Q 30.30 di 1.64 or 27.80 hy 0.50 ab 33.01 mt 3.02 an 2.50 il 0.76	Benmore Lodge, Loch Ba, Mull, Scotland.	E. G. Radley.	G. S. Gr. Br., Sum. Prog. (1912), p. 69, 1913.	Granophyre.	
115	I''''4.1''3.	Q 31.68 di 3.19 or 31.14 hy 0.36 ab 27.77 mt 3.02 an 2.50 il 0.61	Beinn a' Ghraig, Mull, Scotland.	E. G. Radley.	G. S. Gr. Br., Sum. Prog. (1912), p. 68, 1913.	Rhyolite.	
116	I(II)''4.1.3.	Q 29.52 di 3.78 or 27.50 hy 2.58 ab 28.82 mt 2.55 an 1.39 il 1.06 ap 0.67	Craignure Bay, Mull, Scotland.	E. G. Radley.	J. J. H. Teall, G. S. Gr. Br., Sum. Prog. (1913), p. 80, 1914.	Augite grano- phyre.	
117	I.4.1.3.⊙	Q 27.60 hy 0.60 or 36.70 mt 0.93 ab 27.25 il 0.91 an 1.39 C 2.86	Duffon Pike, Westmoreland, England.	P. Holland.	F. Rutley, Q. J. G. S., LVII, p. 36, 1901.	Rhyolite.	"H ₂ O" includes loss and CO ₂ .

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
118	76.43	13.56	0.08	0.55	0.54	0.03	4.19	4.72	0.76	0.06					100.92	
A3. III	1.274	.133	.001	.008	.014	—	.068	.050								
119	75.96	12.86	0.57	0.10	0.38	0.46	4.35	4.54	0.39	0.27	0.07	0.04	0.19	CO ₂ none S NIO none BaO none	100.18	
A1. I	1.266	.126	.004	.001	.010	.008	.070	.048			.001	—	.003			
120	70.23	14.73	2.37	0.98	0.50	0.94	4.19	5.13	0.70				0.18		99.95	2.65
A3. III	1.171	.144	.015	.014	.013	.017	.068	.054					.003			
121	74.51	13.01	n. d.	1.06	0.39	0.71	4.80	5.07	0.85		0.13				100.53	
A4. IV	1.242	.127	—	.015	.010	.013	.077	.054			.002					
122	74.40	13.91	1.39	n. d.	0.28	0.61	4.65	4.36	0.65						100.25	
A4. IV	1.240	.138	.009	(.018)	.007	.010	.075	.047								
123	73.90	11.93	0.15	0.87	0.13	0.34	4.10	4.62	4.00						100.04	
A3. III	1.232	.117	.001	.012	.003	.006	.066	.049								
124	73.90	10.95	0.08	1.06	1.08	1.58	4.08	4.60	3.35						100.68	
A3. III	1.232	.108	.001	.015	.027	.029	.066	.049								
125	73.00	15.20	1.86	n. d.	1.01	0.56	3.44	4.14	1.25						100.46	
A4. IV	1.217	.149	.012	(.024)	.025	.010	.055	.044								
126	71.35	13.60	3.12	0.96	trace	trace	5.12	6.74							100.89	
B3. IV	1.189	.133	.019	.014	—	—	.082	.071								
127	70.04	12.72	2.16	2.61	0.22	0.94	4.40	5.05	0.63		0.45				99.22	
B3. IV	1.167	.525	.014	.036	.006	.017	.071	.054			.006					
128	76.05	11.68	0.34	1.05	0.29	0.42	3.79	5.09	1.36		0.05		trace	ZrO ₂ 0.42 F Li ₂ O trace	100.54	2.636
A2. II	1.268	.114	.002	.015	.007	.008	.060	.054								
129	71.49	15.33	2.15	n. d.	none	0.30	4.32	5.86	0.54		0.45		trace		100.44	
A4. IV	1.192	.150	.014	(.028)	—	.005	.070	.062			.006		—			
130	69.00	13.95	1.56	2.38	0.14	0.49	5.67	5.11	0.70		0.35		0.55		99.95	
A2. II	1.150	.137	.010	.033	.004	.009	.091	.054			.004		.008			
131	68.95	14.00	2.12	3.56	0.07	0.23	5.45	5.29	0.05		0.35		0.55		100.62	
A2. B	1.149	.137	.013	.049	.002	.004	.088	.056			.004		.008			
132	66.40	17.37	4.30	0.50	0.20	0.75	3.88	4.39	0.50		1.00		0.11		99.40	
B2. III	1.107	.170	.027	.007	.005	.014	.063	.047			.012		.002			
133	75.62	11.75	1.95	0.83	0.17	0.39	3.63	4.91	0.20		0.10	0.01	0.04	CO ₂ 0.22 S 0.04	99.97	
A2. II	1.260	.115	.012	.011	.004	.007	.058	.052			.001	—	—			
134	72.86	13.41	2.38	0.97	0.52	0.81	3.72	3.80	0.40		0.50		0.06		99.43	
B2. III	1.214	.131	.015	.014	.013	.014	.060	.040			.006		.001			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
118	I''4.1.3''.	Q 32.70 hy 2.32 or 27.80 mt 0.23 ab 35.63 C 1.53	Eskdale, Cumberland, England.	A. R. Dwerry- house.	A. R. Dwerryhouse, Q. J. G. S., LXV, p. 64, 1909.	Granite.	Cf. No. 1, I.1.
119	I''4.1''3''.	Q 31.92 hy 1.00 or 26.69 mt 0.40 ab 36.68 il 0.15 an 2.22 hm 0.16	Gew Graze, Cornwall.	E. G. Radley.	Flett and Hill, Mem. G. S. Eng., Sh. 359, p. 144, 1912.	Granite.	Dike in ser- pentine.
120	I.4.1(2).3.	Q 23.40 hy 1.56 or 30.02 mt 3.45 ab 35.63 an 4.73 C 0.52	Fort Regent, St. Helier, Jersey, Channel Islands.	P. Holland.	Holland and Dickson, Pr. Liv. G. Soc., VII, p. 116, 1897.	Granite.	Not in W. T.
121	I''4.1.3''.	Q 25.68 ac 1.85 or 30.02 di 3.03 ab 38.25 hy 1.19 il 0.30	Bizeul, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 141, 1913.	Micropeg- matite.	
122	I.4.1''3(4).	Q 27.78 hy 3.08 or 26.13 ab 39.30 an 2.78 C 0.41	Pelvoux, France.	P. Termier?	P. Termier, C. R., CXXIV, p. 318, 1897.	Granite.	In W. T., p. 151.
123	I''4.1.3''.	Q 31.20 di 0.96 or 27.24 hy 1.26 ab 34.58 mt 0.23 an 0.56	Sailles, Mont Dore, France.	Pisani.	A. Lacroix, C. R., CXLVII, p. 779, 1908.	Rhyolite pumice.	
124	I''(3)4.1.3.	Q 30.30 ac 0.46 or 27.24 ns 0.73 ab 30.92 di 6.55 hy 1.23	Ludières, Mont Dore, France.	Pisani.	A. Lacroix, C. R., CXLVII, p. 779, 1908.	Rhyolite pumice.	
125	I.(3)4.1''3.	Q 33.24 hy 5.67 or 24.46 ab 28.82 an 2.78 C 4.08	Ile Longue, Brittany, France.	Not stated.	C. Barrois, VIII Cong. G. Int., Guide Exc., VII, p. 21, 1900.	Aplite.	In W. T., p. 129.
126	I(II).4.1.3.	Q 18.00 ac 8.78 or 39.48 ns 0.12 ab 32.49 hy 1.85	Lonca Valley, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 49, 1906.	Quartz orthophyre.	
127	I''4.1.3''.	Q 22.68 di 4.05 or 30.02 hy 0.63 ab 37.20 mt 3.25 il 0.91	Svolvaer, Lofoten Islands, Norway.	R. Mauzelius,	P. J. Holmquist, B. Un. Ups., VII, p. 268, 1906.	Granite.	
128	I.(3)4.1.3.	Q 33.18 di 1.89 or 30.02 hy 1.33 ab 31.44 mt 0.46 Z 0.55	Drammen, Norway.	P. Jannasch.	H. O. Lang, Nyt. Mag., XXX, p. 40, 1886.	Quartz porphyry.	In W. T., p. 151.
129	I.4.1.3.⊙	Q 22.08 hy 2.90 or 34.47 il 0.91 ab 36.68 an 1.39 C 1.33	Gislerud, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Quartz porphyry.	In W. T., p. 151.
130	I(II).4''1.3(4).	Q 14.88 ac 3.70 or 30.02 di 2.20 ab 43.49 hy 3.86 mt 0.46 il 0.61	Frön, Christiania, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 139, 1894.	Quartz lindoite.	Center of dike. In W. T., p. 151.
131	I(II).4''1.3''.	Q 14.76 ac 3.23 or 31.14 di 0.99 ab 42.44 hy 5.88 mt 1.39 il 0.61	Frön, Christiania, Norway.	V. Schmelek.	W. C. Brögger, Eg. Kg., I, p. 139, 1894.	Arfvedsonite grorudite.	Border of dike, In W. T., p. 151.
132	I.4.1(2).3.	Q 24.84 hy 0.50 or 26.13 il 1.37 ab 33.01 hm 4.30 an 3.89 ru 0.24 C 4.69	Fjelebu, Norway.	G. Särnstrom.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Quartz syenite porphyry.	In W. T., p. 151.
133	I.(3)4.1.3.	Q 35.04 di 0.43 or 28.91 hv 0.20 ab 30.39 mt 2.32 il 0.15 an 1.39 hm 0.32	Sakaravaara, Lapland, Sweden.	R. Mauzelius.	P. Geijer, G. Kir. Dist., p. 200, 1910.	Quartz porphyry.	
134	I.(3)4.1(2).3(4).	Q 34.38 hy 1.30 or 22.24 mt 2.09 ab 31.44 il 0.91 an 3.89 hm 0.96 C 1.73	Maskotjakko, Stora Sjöfallet, Lapland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 256, 1906.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
135	69.08	12.75	5.84	2.16	0.50	0.28	3.97	4.39	0.78		0.27	0.02	0.02	S 0.02	100.08	
A2. II	1.151	.125	.036	.030	.013	.005	.065	.046			.003	—	—			
136	73.77	12.68	2.40	0.45	0.33	0.46	3.14	5.58	0.28	0.18	0.22	trace	0.01	ZrO ₂ none F 0.21 S 0.07 BaO none	99.78	
A1. I	1.230	.124	.015	.006	.008	.008	.051	.060			.003	—	—			
137	72.78	12.79	2.57	1.73	0.27	0.64	3.17	5.16	0.55		0.50		0.18		100.34	
A2. II	1.213	.125	.016	.024	.007	.011	.051	.056			.006		.003			
138	72.22	14.80	0.96	0.80	0.33	0.74	4.16	5.16	0.71		0.57		0.13		100.58	
A2. II	1.204	.145	.006	.011	.008	.013	.067	.056			.007		.002			
139	71.25	13.90	1.28	1.24	0.45	0.97	3.29	6.28	0.83		0.32		trace		99.81	
A2. II	1.188	.136	.008	.017	.011	.018	.053	.067			.004		—			
140	69.73	13.02	2.28	1.92	0.21	1.16	3.08	5.78	1.94	0.38	0.29		trace		99.79	
A2. II	1.162	.127	.014	.027	.005	.021	.050	.062			.003		—			
141	76.64	13.50	0.50	n. d.	0.12	0.65	3.48	5.51	n. d.						100.40	
A4. IV	1.277	.132	.003	(.006)	.003	.011	.056	.059								
142	75.62	11.81	n. d.	1.59	0.55	0.36	2.83	5.78	0.54		0.59				99.67	
A4. IV	1.260	.116	—	.022	.014	.006	.045	.062			.007					
143	75.22	12.07	1.82	1.24	0.20	0.50	3.98	4.37	0.15		0.34		0.13	CO ₂ 0.11	100.13	
A2. II	1.254	.118	.011	.017	.005	.009	.065	.046			.004		.002			
144	73.03	12.35	1.17	0.71	0.46	2.13	3.54	4.98	0.99		0.32		0.56		100.24	
A2. II	1.217	.121	.007	.010	.012	.038	.057	.053			.004		.008			
145	71.51	12.82	2.09	1.40	0.17	1.09	4.24	4.52	1.23		0.10	trace			99.17	
B3. IV	1.192	.125	.013	.019	.004	.020	.068	.048			.001	—				
146	67.75	13.37	4.82	1.69	0.44	1.04	4.24	5.13	1.13		0.24		0.38		100.23	
A2. II	1.129	.131	.030	.024	.011	.019	.068	.054			.003		.005			
147	76.34	12.65	0.59	0.28	0.11	0.69	4.58	4.48	0.19		0.10	trace	0.01	S 0.05	100.07	
A2. II	1.272	.124	.004	.004	.003	.013	.074	.048			.001	—	—			
148	70.90	14.70	1.79	0.46	0.10	0.30	3.85	6.93	0.17		0.44	0.02	0.01	S 0.05	99.72	
A2. II	1.182	.144	.011	.008	.003	.005	.062	.073			.006	—	—			
149	69.36	15.00	2.84	0.55	0.49	0.41	5.23	5.31	0.25		0.45	0.08	0.01	S 0.06	100.04	
A2. II	1.156	.147	.018	.008	.012	.007	.084	.056			.006	—	—			
150	68.81	14.30	3.04	0.92	0.32	1.47	4.30	5.39	0.92		0.42	0.14	0.15	BaO 0.09	100.27	
A2. II	1.147	.140	.019	.013	.008	.027	.069	.057			.005	.001	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
135	I(II)''4.1.3''.	Q 27.72 hy 1.30 or 25.58 mt 6.26 ab 34.06 il 0.46 an 1.39 hm 1.44 C 0.92	Kiirunavaara, Lapland, Sweden.	K. Schröder.	P. Geijer, G. Kir. Dist., p. 132, 1910.	Quartz porphyry.	
136	I.(3)4.1''3.	Q 32.40 hy 0.80 or 33.36 mt 0.70 ab 26.72 il 1.92 an 2.22 C 0.51	Norrtaskberget, N. Ulön, Nordingra Region, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 90, 1913.	Granite.	
137	I''4.1''3.	Q 32.20 hy 1.36 or 31.12 mt 1.39 ab 26.72 il 0.91 an 3.06 C 0.82	Storholm, n. Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 38, 1899.	Felsite porphyry.	In W. T., p. 151.
138	I.4.1(2).3.	Q 25.92 hy 0.80 or 31.14 mt 1.39 ab 35.12 il 1.06 an 3.61 C 0.92	Storholm, n. Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 51, 1899.	Quartz porphyry.	In W. T., p. 151.
139	I.4.1(2).3.	Q 25.08 di 0.43 or 37.25 hy 1.56 ab 27.77 mt 1.83 an 4.45 il 0.61	Rödö, Sweden.	N. Sahlbom.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 25, 1899.	Rapakiwi granite porphyry.	In W. T., p. 151.
140	I''4.1(2).3.	Q 26.34 di 1.43 or 34.47 hy 1.09 ab 26.20 mt 3.25 an 4.17 il 0.46	Gorgvik, Rödö, Sweden.	N. Sahlbom.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 34, 1899.	Felsite porphyry.	In W. T., p. 151.
141	I''4.1''3.	Q 33.36 hy 1.09 or 32.80 ab 23.34 an 3.05 C 0.61	Arild, Kullen, Sweden.	L. Ramberg.	A. Hennig, Act. Un. Lund., XXXIV, p. 41, 1898.	Granitite.	In W. T., p. 151.
142	I.(3)4.1''3.	Q 34.62 hy 3.38 or 34.47 il 1.06 ab 23.58 an 1.67 C 0.31	Kvarunäs, Oskarshamn, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
143	I.(3)4.1.3''.	Q 33.78 di 0.46 or 23.58 hy 0.80 ab 34.06 mt 2.55 an 1.95 il 0.61	Jungfrun Island, Kalmarsund, Oskarshamn, Sweden.	E. Östlund.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
144	I''''4.1''3.	Q 29.34 di 4.32 or 29.47 wo 0.93 ab 29.87 mt 1.62 an 3.06 il 0.61	Uthammar, Oskarshamn, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
145	I.4.1''3''.	Q 27.48 di 2.10 or 26.68 wo 0.23 ab 35.63 mt 3.02 an 2.50 il 0.15	Sätersfugen, Brefven, Sweden.	K. Winge.	K. Winge, G. F. F., XVIII, p. 195, 1896.	Granite.	In W. T., p. 151.
146	I(II)4.1''3.	Q 21.48 di 2.16 or 30.02 hy 0.10 ab 35.63 mt 6.03 an 2.50 il 0.46 hm 0.64	Stadsberg, Ragunda Massif, Jemtland, Sweden.	H. Santesson.	A. G. Högbom, Afh. Sv. G. Und., No. 182, p. 45, 1899.	Syenite porphyry.	Not in W. T.
147	I''4.1.3(4).	Q 31.56 di 0.65 or 26.69 wo 0.93 ab 38.77 mt 0.70 an 0.56 il 0.15 hm 0.16	Ridderstolpe, Gellivare, Sweden.	G. Nyblom.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Granite.	
148	I.4.1.3.⊙	Q 21.54 hy 0.30 or 40.39 il 0.91 ab 32.49 hm 1.79 an 1.39 hm 1.79 C 0.41	Kapten, Gellivare, Sweden.	G. Nyblom.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Quartz syenite porphyry.	
149	I.4''1.3(4).	Q 17.40 hy 1.20 or 31.14 mt 0.46 ab 44.01 il 0.91 an 1.95 hm 2.56	Wällkommen, Gellivare, Sweden.	G. Nyblom.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Syenite (gneissoid).	
150	I''4.1(2).3.	Q 20.70 di 1.73 or 31.69 wo 0.23 ab 36.15 mt 2.32 an 3.89 il 0.76 hm 1.44 ap 0.34	Näffinge, Linderöd, Scania, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite gneiss.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+ H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
151	75.06	11.70	1.04	1.57	0.19	1.01	2.56	6.25	0.63	0.36				100.37	
A3. III	1.251	.115	.006	.022	.005	.018	.041	.067		.004					
152	72.59	13.90	2.03	n. d.	0.61	0.68	2.87	6.79	0.40	0.15		trace	SO ₃ trace	100.02	
A4. IV	1.210	.136	.013	(.026)	.015	.013	.047	.072				—			
153	70.39	14.60	0.87	2.15	0.56	0.20	4.04	4.84	0.12	0.56	1.10	0.22		99.65	
A2. II	1.173	.143	.005	.030	.014	.004	.065	.051		.007	.008	.003			
154	73.77	11.97	1.84	0.78	0.23	1.10	2.75	5.61	0.49	0.65	0.32			99.51	
A3. III	1.230	.117	.012	.011	.006	.020	.045	.060		.004					
155	75.24	11.00	2.21	1.57	0.24	trace	3.86	4.78	0.42	0.20	0.25			99.77	
A3. III	1.254	.108	.014	.022	.006	—	.062	.051			.003				
156	73.58	15.21	0.41	n. d.	0.17	0.11	3.61	6.66	0.22	0.20		trace		100.17	
A3. III	1.226	.149	.003	(.006)	.004	.002	.058	.071		.003					
157	71.22	13.58	2.36	0.90	0.24	0.35	3.58	6.48	0.82	0.71	0.10	0.29		100.63	
A2. II	1.187	1.33	.015	.013	.006	.006	.058	.069		.009	.001	.004			
158	73.52	14.03	0.31	1.00	0.17	0.39	4.00	5.59	0.75	trace	0.24			100.00	
A3. III	1.225	.137	.002	.014	.004	.007	.065	.060		—	.002				
159	68.60	16.76	0.93	0.52	0.79	0.86	4.49	6.46	0.78					100.19	2.602
A3. III	1.143	.164	.006	.007	.020	.015	.072	.069							
160	74.00	15.06	1.54	n. d.	0.28	0.71	3.51	4.03	1.07					100.20	
A3. III	1.233	.148	.010	(.020)	.007	.013	.056	.042							
161	76.03	11.76	1.99	n. d.	0.27	0.45	3.36	5.61	0.63					100.10	
A4. IV	1.267	.115	.013	(.026)	.007	.008	.054	.060							
162	75.65	12.02	0.20	trace	1.04	1.16	3.13	5.60	1.10			trace		99.90	2.60
A3. III	1.261	.118	.001	(.002)	.026	.021	.050	.060				—			
163	75.26	13.32	2.02	trace	0.34	trace	3.72	4.57	0.79			trace		100.02	2.63
v3. III	1.254	.130	.013	(.026)	.008	—	.060	.049				—			
164	70.85	15.79	.120	1.27	trace	0.26	3.37	6.69	0.89	0.22	trace		CO ₂ SO ₃ trace 0.06	100.60	2.599
A3. III	1.181	.155	.007	.018	—	.005	.055	.071		.003	—				
165	67.02	14.32	1.10	1.87	0.78	2.38	4.54	5.48	0.43	0.15	0.08		SO ₃ 0.14	100.29	2.654
A2. II	1.117	.140	.007	.026	.020	.043	.073	.058		.002	—				
166	66.28	16.64	1.18	1.68	0.84	0.52	3.91	6.43	1.45	0.61	0.17		CO ₂ SO ₃ 0.17 0.13	100.01	2.589
A2. II	1.105	.163	.007	.024	.021	.009	.063	.068		.008	.001				
167	75.97	10.84	n. d.	2.03	0.16	1.01	4.23	4.91	0.49					99.64	
A4. IV	1.266	.106	—	.028	.004	.018	.068	.052							

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
151	I.(3)4.1.(2)3.	Q 33.36 di 2.57 or 37.25 hy 1.39 ab 21.48 mt 1.39 an 1.95 il 0.62	Hogland Island, Finland.	Von Ungern Sternberg.	Von Ungern Sternberg, In. Diss. Leipz., 1882.	Rapakivi granite.	Cf. W. Ramsay, G. F. F., XII, p. 486, 1890. In W. T., p. 153.
152	I.4.1''.(2)3.	Q 25.74 hy 4.93 or 40.03 ab 24.63 an 3.61 C 6.41	Kullerberg, Pitkäranta, Finland.	A. Poehl.	O. Trüstedt, B. Com. G. Fin., No. 19, p. 58, 1907.	Granite.	3 decimals.
153	I''4.1.3.	Q 26.64 hy 4.17 or 28.36 mt 1.16 ab 34.06 il 1.06 an 1.11 C 2.35	Hangasaja, Lapland, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., No. 15, p. 40, 1905.	Granite porphyry.	P ₂ O ₅ high.
154	I.(3)4.1(2)''3.	Q 33.72 di 1.30 or 33.36 wo 0.23 ab 23.58 mt 1.62 an 3.34 il 0.61 hm 0.80	Hammeren, Bornholm Island.	M. Dittrich.	G. Kalb, In. Diss. Greifs., p. 14, 1914.	Granite.	L. Milch, pers. com.
155	I''(3)4.1.3.	Q 34.20 ac 2.31 or 28.36 hy 1.82 ab 29.87 mt 2.09 il 1.46	Waldow, Rummelsberg, Pomerania.	M. Dittrich.	L. Milch, Mt. Nw. Ver. Neupom., XLI, p. (10), 1909.	Granite porphyry.	Pebble. Sameas No. 169.
156	I.4.1.3.⊙	Q 26.46 hy 0.80 or 39.48 il 0.46 ab 30.39 an 0.56 C 1.84	Sattelberg, n. Niederkirchen, Bayrischer Rheinpfalz.	A. Schwager.	M. Schuster, Geogn. Jheft., XIX, p. 57 (1906), 1908.	Aplite.	
157	I.4.1.3.⊙	Q 24.78 hy 0.60 or 38.36 mt 1.86 ab 30.39 il 1.37 an 0.83 hm 1.12 C 0.31 ap 0.34	Sattelberg, n. Niederkirchen, Bayrischer, Rheinpfalz.	A. Schwager.	M. Schuster, Geogn. Jheft., XIX, p. 57 (1906), 1908.	Aplite.	
158	I.4.1.3.⊙	Q 27.54 hy 1.98 or 33.36 mt 0.46 ab 34.06 ap 0.67 C 1.22	Eisenbach, Schwarzwald, Baden.	M. Dittrich.	M. Dittrich, Mt. Bad. G. L.-A., V, (1), p. 8, 1907.	Granite.	
159	I.4''1''3.	Q 15.18 hy 2.00 or 37.81 mt 1.39 ab 37.73 an 4.17 C 0.82	Giernigerloch, Baden.	M. Dittrich.	F. Schalch, Sp. Kte. Bad., Bl. Petersthal, p. 33, 1895.	Granite.	In W. T., p. 153.
160	I.(3)4.1(2).3''.	Q 35.52 hy 3.34 or 23.35 ab 29.34 an 3.61 C 3.77	Rauhfel, Baiersbronn, Württemberg.	Not stated.	K. Regelmann, Erl. G. Kt. Wurt., Bl. 92, p. 34, 1908.	Granite.	
161	I''4.1.3.	Q 32.46 di 1.67 or 33.36 hy 3.27 ab 28.30 an 0.28	Thal, Thuringer Wald.	Not stated.	K. Futterer, Mt. Bad. B. L.-A., II, p. 58 (1890), 1893.	Quartz porphyry.	In W. T., p. 151.
162	I''4.1''3.	Q 32.64 di 2.84 or 33.36 hy 1.53 ab 26.20 an 2.22	Gottlob, Friederichsroda, Thuringia.	A. Muhlen- berg.	A. Muhlenberg, In. Diss. Halle, p. 33, 1908.	Granite.	Pebble in con- glomerate.
163	I.(3)4.1.3.	Q 33.96 hy 4.23 or 27.24 ab 31.44 C 2.14	Gottlob, Friederichsroda, Thuringia.	A. Muhlen- berg.	A. Muhlenberg, In. Diss. Halle, p. 33, 1908.	Granite.	Pebble in con- glomerate.
164	I.4.1.''3.	Q 24.42 hy 1.06 or 39.48 mt 1.62 ab 28.82 il 0.46 an 1.39 C 2.45	Tanngrund, Schleuse Thal, Thüringerwald.	Schade.	H. Loretz, Jb. Pr. G., L.-A., IX, p. 295, 1889.	Quartz porphyry.	In W. T., p. 153.
165	I(II).4''1''3.	Q 14.52 di 7.85 or 32.25 hy 0.33 ab 38.25 mt 1.02 an 2.50 il 0.30	Ehrenberg, n. Ihmenau, Thüringerwald.	Klüss.	R. Cronacher, In. Diss. Greifs., p. 59, 1909.	Quartz syenite aplite.	
166	I.4''1.3.	Q 16.62 hy 3.29 or 37.81 mt 1.62 ab 33.01 il 1.22 an 1.67 ap 0.34 C 2.65	Schleuse River, Thüringerwald.	G. F. Steffen.	H. Loretz, Jb. Pr. C., L.-A., IX, p. 290, 1889.	Granite porphyry.	In W. T., p. 153.
167	I''(3)4.1.3.	Q 33.12 ac 6.47 or 28.91 di 0.86 ab 28.30 wo 1.63	Dreibrunnen, Milbocus, Odenwald, Hesse.	F. Kutscher.	C. Chelius, Notbl. Ver. Erdk., (4) XIII, p. 8, 1892.	Aplite.	In W. T., p. 153.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
168	73.77	14.13	0.80	0.75	0.27	0.35	2.75	5.99	1.29		0.10	0.18		SO ₂ 0.08	100.46	2.622
A2, II	1.230	.138	.005	.010	.007	.006	.044	.064			.001	.001				
169	75.24	11.00	2.21	1.57	0.24	trace	3.86	4.78	0.42	0.20	0.25				99.77	
A3, III	1.254	.108	.014	.022	.006	—	.062	.051			.003					
170	75.05	12.66	0.99	1.07	0.11	0.87	3.01	5.64	0.53			0.11		SO ₂ 0.10	100.14	2.625
A3, III	1.251	.124	.006	.015	.003	.016	.048	.060				.001				
171	74.73	12.49	1.73	0.32	0.18	0.51	2.83	6.12	0.79			0.09		CO ₂ 0.32 SO ₂ 0.19	100.30	2.610
A2, II	1.246	.122	.011	.004	.005	.009	.045	.065				—				
172	76.58	13.52	0.45	0.15	0.31	0.73	4.05	4.58	0.38						100.75	
A3, III	1.276	.133	.003	.002	.008	.013	.066	.049								
173	75.67	12.12	1.87	0.29	0.17	0.75	4.90	4.25	0.46						100.48	
A3, III	1.261	.119	.012	.004	.004	.014	.079	.046							(100.47)	
174	74.02	13.90	1.00	0.27	0.24	0.77	4.53	4.41	0.73						99.87	
A3, III	1.234	.136	.006	.004	.006	.014	.073	.047								
175	73.58	14.30	1.34	0.27	0.44	0.88	4.06	5.22	0.64						100.73	
A3, III	1.226	.140	.008	.004	.011	.016	.066	.055								
176	71.42	14.17	2.13	0.26	0.34	0.73	4.35	5.95	1.17						100.52	
A3, III	1.190	.139	.013	.004	.009	.013	.070	.064								
177	67.51	13.65	4.42	1.29	0.80	2.29	4.61	4.20	0.99		0.28	0.16			100.20	
A2, II	1.125	.134	.028	.018	.020	.041	.074	.045			.004	.001				
178	73.80	12.70	1.34	0.17	0.15	0.79	4.02	5.59	1.08		0.15	trace	trace	CO ₂ 0.11	99.90	2.598
A2, II	1.230	.124	.008	.002	.004	.014	.065	.060			.002	—	—			
179	70.48	13.44	2.13	1.32	0.60	1.51	4.06	4.98	0.60		0.44	0.47	trace	CO ₂ 0.10	100.13	2.630
A2, II	1.175	.131	.013	.018	.015	.027	.066	.053			.006	.003	—			
180	74.09	13.40	0.64	0.85	0.28	0.91	4.61	4.70	0.66			0.40			100.54	
A3, III	1.235	.131	.004	.012	.007	.016	.074	.050				.003				
181	69.30	12.75	2.26	2.90	0.92	1.56	3.89	4.61	1.11		0.13	0.38			99.81	
A2, II	1.155	.125	.014	.040	.023	.028	.063	.049			.002	.003				
182	73.92	12.72	0.86	1.14	0.44	1.14	3.55	5.65	0.50		0.06	0.36			100.34	
A2, II	1.232	.125	.005	.016	.011	.020	.057	.061			.001	.003				

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
168	I.(3)4.1.'3.	Q 33.90 hy 1.23 or 35.58 mt 1.16 ab 23.06 il 0.15 an 0.83 ap 0.34 C 2.75	Magdeburg, Prussia.	Fischer.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 186 (1890), 1892.	Quartz porphyry breccia.	In W. T., p. 153.
169	I''(3)4.1.3.	Q 34.20 ac 2.31 or 28.36 hy 1.92 ab 29.87 mt 2.09 il 0.46	Waldow, Pommern.	M. Dittrich.	L. Milch, Mt. Nw. Ver. Neup., XLI, p. (10), 1909.	Granite porphyry.	Glacial boulder. Same as No. 155.
170	I.(3)4.1(2).3.	Q 34.02 hy 1.49 or 33.36 mt 1.39 ab 25.15 ap 0.34 an 3.61 C 0.31	Wolfsklippen, n. Plessenburg, Brocken, Harz.	Klüss.	O. H. Erdmannsdoer- fer, Jb. Pr. G. L.-A., XXVII, p. 350, 1906.	Granite porphyry.	
171	I.''4.1''.'3.	Q 33.78 hy 0.50 or 36.14 mt 0.93 ab 23.58 hm 1.12 an 2.50 C 0.31	Tännental, n. Pflessenburg, Brocken, Harz.	Eyme.	O. H. Erdmannsdoer- fer, Jb. Pr. G. L.-A., XXVII, p. 344, 1906.	Granite.	
172	I.''4.1(2).3''.	Q 33.12 hy 0.80 or 27.24 mt 0.46 ab 34.58 il 0.15 an 3.61 C 0.51	Zadel, n. Meissen, Saxony.	E. Worm.	E. Worm, In. Diss. Leip., p. 32, 1913.	Aplite.	
173	I.''4.1.3(4).	Q 29.70 ac 2.77 or 25.58 di 0.86 ab 38.25 wo 1.16 mt 0.93 hm 0.32	Near Meissen, Saxony.	E. Worm.	E. Worm, In. Diss. Leip., p. 32, 1913.	Aplite.	
174	I.4.1(2).3(4).	Q 28.80 hy 0.60 or 26.13 mt 0.93 ab 38.15 hm 0.30 an 3.89 C 0.20	Near Meissen, Saxony.	E. Worm.	E. Worm, In. Diss. Leip., p. 32, 1913.	Aplite.	
175	I.4.1(2).3.	Q 27.42 hy 1.10 or 30.58 mt 0.93 ab 34.58 hm 0.64 an 4.45 C 0.31	Near Meissen, Saxony.	E. Worm.	E. Worm, In. Diss. Leip., p. 32, 1913.	Granite.	
176	I.4.1.3.⊙	Q 21.54 di 1.73 or 35.58 hy 0.10 ab 36.68 mt 0.93 an 1.39 hm 1.44	Rottewitz, n. Meissen, Saxony.	E. Worm.	E. Worm, In. Diss. Leip., p. 32, 1913.	Granite.	
177	I(II).4.1(2).3(4).	Q 20.28 di 4.32 or 25.02 wo 0.35 ab 38.77 mt 3.25 il 0.61 an 4.17 hm 2.24 ap 0.34	Zadel, n. Meissen, Saxony.	E. Worm.	E. Worm, In. Diss. Leip., p. 32, 1913.	Granite.	
178	I.4.1.3.⊙	Q 27.84 ac 0.46 or 33.36 di 0.86 ab 33.54 wo 1.16 il 0.30 hm 1.12	Breiterberg, n. Lüptitz, Saxony.	C. Ambronn.	C. Ambronn, In. Diss. Leip., p. 43, 1907.	Schliere in quartz porphyry.	
179	I''. 4. 1''. 3.	Q 25.02 di 1.08 or 29.47 hy 1.00 ab 34.58 mt 2.78 an 3.84 il 0.91 hm 0.16 ap 1.01	Spielberg, n. Collmen, Saxony.	C. Ambronn.	C. Ambronn, In. Diss. Leip., p. 32, 1907.	Quartz porphyry.	
180	I.4.1.3(4).	Q 27.84 hy 1.76 or 27.80 mt 0.93 ab 38.77 ap 1.01 an 1.67 C 0.10	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 30, 1909.	Center of schliere in granite.	Also Milch and Riegner, N. d. B. B., XXIX, p. 376, 1910. Cf. No. 270, I.4.2.3.
181	I(II).4.1(2).3.	Q 24.30 di 1.18 or 27.24 hy 4.87 ab 33.01 mt 3.25 an 3.61 il 0.30 ap 1.01	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 31, 1909.	Border of schliere in granite.	Also as above. Cf. Nos. 180, 182.
182	I.4.1.3.	Q 29.16 di 0.68 or 33.92 hy 2.09 ab 29.87 mt 1.39 an 1.95 il 0.15 ap 1.01	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 34, 1909.	Granite about schliere.	Also as above. Cf. No. 56, II.5.2.3 and No. 71, II.5.2.4.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
183	76.42	12.73	0.69	0.20	0.31	0.68	3.75	5.06	0.39						100.23	
A3, III	1.274	.125	.004	.003	.008	.015	.061	.054								
184	74.03	13.87	0.09	0.95	0.15	0.30	3.71	6.14	1.17		trace	0.27		F Li ₂ O Cu	100.68	2.662
A2, II	1.234	.136	.001	.013	.004	.005	.059	.056			—	.002		trace trace		
185	73.00	15.02	1.51	0.91	0.35	0.40	3.85	4.42	0.62		0.58				100.66	
A3, III	1.217	.147	.009	.013	.009	.007	.062	.046			.007					
186	72.68	16.10	2.19	n. d.	0.21	0.58	3.39	4.46	0.52						100.13	
A4, IV	1.211	.158	.014	(.028)	.005	.010	.055	.048								
187	72.87	14.90	1.80	1.05	0.18	0.75	3.03	5.00	0.32						99.90	
A3, III	1.215	.146	.011	.015	.005	.014	.048	.053								
188	70.10	15.44	0.57	n. d.	0.30	0.25	3.90	7.91	0.99						99.46	
B3, IV	1.168	.151	.004	(.008)	.008	.004	.063	.084								
189	76.23	12.04	0.63	0.77	0.41	0.44	4.06	4.11	0.97	0.15	0.09				99.90	2.690
A3, III	1.271	.118	.004	.011	.010	.008	.066	.043			.001					
190	72.00	13.66	1.80	0.22	0.92	0.97	4.16	4.79	1.16	0.08	0.34				100.10	2.674
A3, III	1.200	.134	.011	.003	.023	.017	.067	.051			.004					
191	71.37	13.29	1.64	0.77	0.42	0.95	3.87	5.43	1.48	0.12	0.37				99.71	2.64
A3, III	1.190	.130	.010	.011	.011	.017	.063	.057			.005					
192	75.70	10.83	2.51	0.95	0.08	0.48	4.10	5.08	0.41		0.25				100.19	2.65
A3, III	1.262	.106	.016	.013	.002	.009	.066	.054			.003					
193	75.35	10.84	1.46	2.08	0.13	0.57	3.97	5.05	0.14	0.06	0.23				99.88	2.67
A3, III	1.256	.106	.009	.029	.003	.010	.065	.054			.003					
194	74.88	12.71	1.28	0.56	0.16	0.55	4.02	5.98	0.43	0.12	trace				100.67	2.66
A3, III	1.246	.125	.008	.008	.004	.010	.065	.064			—					
195	74.55	13.35	1.45	0.18	0.24	0.85	3.89	4.57	0.42	0.11	trace	0.15			99.76	2.62
A2, II	1.243	.131	.009	.003	.006	.015	.063	.048			—	.001				
196	74.96	13.65	0.38	0.45	0.05	0.31	4.75	5.09	0.50						100.15	2.62
A3, III	1.249	.134	.003	.006	.001	.005	.077	.054								
197	70.56	14.02	2.01	0.67	0.95	1.69	4.30	4.90	0.55	0.12	0.41				100.18	2.65
A3, III	1.176	.137	.013	.009	.024	.030	.069	.052			.005					
198	76.28	13.19	n. d.	1.23	0.42	0.88	4.18	4.32	0.39	0.12					101.01	2.622
B3, IV	1.271	.129	—	.017	.011	.016	.068	.046								
199	75.34	11.74	1.07	0.36	0.35	0.93	3.12	5.96	0.48	0.11	trace				99.46	2.64
B3, IV	1.256	.115	.007	.005	.009	.017	.050	.063			—					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
183	I''4.1''3.	Q 33.18 di 0.65 or 30.02 hy 0.50 ab 31.96 mt 0.70 an 2.78 hm 0.16	Abruzzen, n. Cunnersdorf, Riesengebirge.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 46, 1909.	Aplite (dikelet in schliere).	
184	I.4.1.3.⊙	Q 28.44 hy 1.98 or 36.11 mt 0.23 ab 30.92 ap 0.67 C 1.22	Kleiner Kornberg, Erzgebirge.	A. Böttger.	F. v. Sandberger, Sb. Münch. Ak., XVIII, p. 466, 1888.	Granite.	In W. T., p. 153.
185	I.(3)4.1.3''.	Q 32.76 hy 0.90 or 25.58 mt 1.39 ab 32.49 il 1.06 an 1.95 hm 0.48 C 3.26	Sattelberg, n. Nieder Kirchen Bl. Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 31, 1910.	Aplite.	
186	I.(3)4.1''3.	Q 32.40 hy 4.20 or 26.69 ab 28.82 an 2.78 C 4.59	Vietsberg, n. Karlsbad, Bohemia.	A. Schwager.	Schwager and v. Gümbel, Geogn. Jhft., VII, p. 69, 1895.	Granite.	In W. T., p. 153.
187	I.(3)4.1(2).3.	Q 34.32 hy 1.03 or 23.47 mt 2.55 ab 25.15 an 3.89 C 3.16	Vlegyasza Moun- tains, Hungary.	Govt. lab.	G. Szadeczky, Ref. N. J., 1903, II, p. 72.	Rhyolite.	
188	I.4''1.1''3.	Q 15.72 hy 1.86 or 46.70 ab 33.01 an 1.11	Zawrat, Tatra Mountains, Hungary.	Z. Weyberg.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Granite.	
189	I.(3)4.1''3(4).	Q 35.10 hy 1.79 or 23.91 mt 0.93 ab 34.58 il 0.15 an 2.22 C 0.10	Inn River, Ardez-Tarasp Road, Lower Engadine, Switzerland.	O. Züst.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 204, 1909.	Quartz porphyry.	
190	I.4.1(2).3''.	Q 26.16 hy 2.30 or 28.36 il 0.46 ab 35.11 hm 1.80 an 4.45 tn 0.20	Galgenhügel, below Sent, Lower Engadine, Switzerland.	O. Züst.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 196, 1909.	Granite.	
191	I.4.1''3.	Q 25.92 di 1.51 or 31.69 hy 0.40 ab 33.01 mt 1.39 an 2.78 il 0.76 hm 0.64	Platta Mala, Lower Engadine, Switzerland.	O. Züst.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 191, 1909.	Granite.	
192	I''(3)4.1.3.	Q 33.06 ac 6.47 or 30.02 di 2.00 ab 27.25 hy 0.10 mt 0.46 il 0.30	Platzero, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, Schw. Chem. Zeit., I, p. (2), 1914.	Paisanite.	Pers. com.
193	I(II).(3)4.1.3.	Q 32.46 ac 4.16 or 30.02 ns 0.49 ab 27.25 di 2.45 hy 2.44 il 0.46	Morteratsch Glacier, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Paisanite.	
194	I.4.1.3.⊙	Q 27.84 ac 1.85 or 35.58 di 1.86 ab 31.96 wo 0.23 mt 0.93	Piz Chalchagu, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, Schw. Chem. Zeit., I, p. (2), 1914.	Alkali granite.	Pers. com.
195	I''4.1(2).3.	Q 32.82 hy 0.60 or 26.69 mt 0.70 ab 33.01 hm 0.96 an 3.34 ap 0.34 C 0.82	Piz Chalchagu, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Aplite.	
196	I.4.1.3''.	Q 27.06 di 0.49 or 30.02 hy 0.23 ab 40.35 mt 0.70 an 0.83	Piz Dadeno, Ponteglia Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Aplite.	
197	I''4.1(2).3.	Q 22.80 di 3.03 or 28.91 hy 1.00 ab 36.15 mt 0.93 an 4.45 il 0.76 hm 1.44	Piz Posta Bialla, Ponteglia Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Aplite.	
198	I''4.1(2).3(4).	Q 31.74 hy 3.15 or 25.58 ab 35.63 an 4.17	Aletschhorn, Aarmassif, Switzerland.	L. Duparc.	E. v. Fellenberg, Btr. G. Kt. Schw., XXI, p. 22, 1893.	Granite gneiss.	Not in W. T.
199	I''4.1.3.	Q 32.88 di 1.94 or 35.02 wo 0.93 ab 26.20 mt 1.16 an 0.56 hm 0.32	Voralp, Aarmassif, Switzerland.	O. Fischer.	O. Fischer, T. M. P. M., XXIV, p. 73, 1905.	Granite porphyry.	Border of dike. Cf. No. 29, I.4.1.2.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
200	73.68	12.70	1.34	0.89	0.21	1.13	4.65	5.37	0.35	0.12	trace				100.44	2.64
A3. III	1.228	.125	.008	.013	.005	.020	.075	.057			—					
201	73.33	15.90	0.06	0.21	trace	0.70	4.36	4.83	0.21	0.11	trace				99.71	2.518
A3. III	1.222	.156	—	0.03	—	.013	.070	.051								
202	73.83	12.66	1.85	0.40	0.35	0.82	2.83	6.39	0.68		0.13				100.08	2.64
A3. III	1.231	.124	.012	.006	.009	.014	.045	.068			.002					
203	73.36	14.59	1.13	0.47	0.23	1.28	3.53	4.43	0.59	0.06	trace	0.43	0.07		100.17	2.64
A2. II	1.223	.143	.007	.007	.006	.023	.056	.047			—	.003	.001			
204	73.88	13.86	1.10	0.66	0.17	0.41	2.70	6.14	0.76		trace				99.68	2.658
A3. III	1.231	.136	.007	.009	.004	.007	.044	.065			—					
205	70.48	14.48	1.99	0.64	1.04	0.62	2.46	5.98	1.68		0.30				99.67	2.719
A3. III	1.175	.142	.013	.009	.026	.011	.040	.064			.004					
206	70.25	14.01	1.12	1.59	0.94	0.86	2.63	5.97	0.46	0.89	0.43	0.19	0.08		99.42	2.690
B2. III	1.171	.137	.007	.022	.024	.015	.042	.062			.005	.001	.001			
207	73.23	11.46	2.44	1.15	0.63	0.51	4.12	5.33	0.44	0.14					99.45	2.60
B3. IV	1.221	.112	.015	.016	.016	.009	.066	.056								
208	65.95	15.24	1.18	2.27	1.87	1.22	3.78	5.02	1.91	0.10	0.64	0.47	trace		99.65	
A2. II	1.099	.149	.008	.032	.047	.021	.061	.053			.008	.003	—			
209	67.04	16.00	2.11	1.55	0.69	1.00	4.65	5.49	1.53		0.92				100.95	
B3. IV	1.117	.157	.013	.022	.017	.018	.075	.059			.012					
210	74.18	13.91	n. d.	0.83	0.33	0.70	4.91	5.40	0.60		0.12	0.19			101.17	2.56
B3. IV	1.236	.136	—	.011	.008	.013	.079	.057			.002	.001				
211	73.40	13.70	n. d.	1.53	0.62	1.10	4.48	5.34	0.60		0.05	0.25			101.07	2.62
B3. IV	1.223	.134	—	.021	.016	.020	.073	.056			—	.002				
212	73.62	12.32	2.82	0.60	0.51	0.61	3.43	5.57	0.72		trace				100.20	
A3. III	1.227	.121	.018	.008	.013	.011	.055	.060			—					
213	72.13	11.28	4.87	0.51	0.33	1.71	3.92	4.54	0.72		0.44				100.45	
A3. III	1.202	.111	.031	.007	.008	.030	.063	.048			.006					
214	75.17	14.05	0.21	n. d.	0.16	0.32	4.57	5.00	0.45					B ₂ O ₃ trace	99.93	
A3. III	1.253	.138	.001	(.002)	.004	.005	.074	.053								
215	72.89	14.50	n. d.	2.48	1.17	0.58	4.42	4.23	n. d.		0.06				100.33	
A4. IV	1.215	.142	—	.035	.019	.010	.071	.045			.001					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
200	I''4.1.3.	Q 24.78 ac 3.23 or 31.69 di 4.05 ab 35.63 wo 0.35 mt 0.23	Voralp, Aarmassif, Switzerland.	O. Fischer.	O. Fischer. T. M. P. M., XXIV, p. 56, 1905.	Granite.	
201	I.4.1(2).3''.	Q 28.02 hy 0.40 or 28.36 ab 36.98 an 3.61 C 2.24	Piz Giuf, Aarmassif, Switzerland.	Not stated.	F. Weber, Btr. G. Kt. Schw., XIV, p. 102, 1904.	Aplite.	
202	I''4.1''.(2)3.	Q 31.14 di 0.65 or 37.81 hy 0.60 ab 23.58 mt 0.93 an 3.06 il 0.30 hm 1.28	Voralptal, Bernese Alps, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite porphyry.	
203	I.(3)4.1(2).3.	Q 34.32 hy 0.73 or 26.13 mt 1.62 ab 29.34 ap 1.01 an 3.61 C 2.75	Lauffenburg, Bernese Alps, Switzerland.	L. Hezner.	P. Niggli, pers. com.	Aplite.	
204	I.(3)4.1.(2)3.	Q 33.42 hy 0.66 or 36.14 mt 1.62 ab 23.06 an 1.85 C 2.04	Inner Ferrera, Rofna, Switzerland.	G. Rüttschi.	G. Rüttschi, In. Diss. Zür., p. 25, 1903.	Aplite.	
205	I''4.1''.(2)3.	Q 30.18 hy 2.60 or 35.58 mt 1.16 ab 20.96 il 0.61 an 3.06 hm 1.28 C 2.75	Mulin, n. Andeer, Rofna, Switzerland.	G. Rüttschi.	G. Rüttschi, In. Diss. Zür., p. 35, 1903.	Granite porphyry.	
206	I''4.1(2).(2)3.	Q 29.28 hy 3.85 or 34.47 mt 1.62 ab 22.01 il 0.76 an 3.34 ap 0.34 C 2.14	Ausser Ferrera, Rofna, Switzerland.	G. Rüttschi.	G. Rüttschi, In. Diss. Zür., p. 19, 1903.	Granite porphyry.	
207	I(II)''4.1.3.	Q 28.38 ac 4.62 or 31.14 di 2.07 ab 29.34 hy 2.02 mt 1.16	Tremola, St. Gotthard, Switzerland.	K. M. Jene.	P. Wainziok, In. Diss. Zür., p. 17, 1906.	Granite.	
208	I(II).4.1''3.	Q 19.80 hy 6.81 or 29.47 mt 1.86 ab 31.96 il 1.22 an 3.06 ap 1.01 C 2.45	Bibertenälpeli, Tödi, Switzer- land.	L. Hezner.	B. G. Escher, In. Diss. Zür., p. 108, 1911.	Granite.	
209	I''4''1(2).3.	Q 15.60 hy 1.70 or 32.80 mt 2.32 ab 39.80 il 1.82 an 5.00 hm 0.48 C 0.51	Käserngrat, Windgälle Mountains, Switzerland.	C. Schmidt.	C. Schmidt, N. J. B. B., IV, p. 432, 1886.	Porphyry.	In W. T., p. 153.
210	I.4.1.3''.	Q 22.98 di 2.32 or 31.69 hy 0.83 ab 41.39 il 0.80 ap 0.34	Gropo Maggio, n. Parma, Italy.	M. Ferrari.	M. Ferrari, Mem. Ac. Linc., (5), VIII, No. 4, p. 176, 1910.	Granite.	
211	I.4.1.3.⊙	Q 23.64 di 1.89 or 31.14 hy 3.41 ab 38.25 ap 0.67 an 1.89	Gropo Maggio, n. Parma, Italy.	M. Ferrari.	M. Ferrari, Mem. Ac. Linc. (5), VIII, No. 4, p. 176, 1910.	Granite.	
212	I''4.1.3.	Q 30.42 di 1.08 or 33.36 hy 0.80 ab 28.82 mt 1.86 an 1.67 hm 1.60	Gavorrano, Tuscany, Italy.	A. Martelli.	A. Martelli, Rend. Ac. Linc., XVIII (2), p. 667, 1909.	Tourmaline granite.	
213	I(II)''4.1.3.	Q 29.88 di 1.73 or 29.47 wo 2.55 ab 33.01 mt 0.23 il 0.91 hm 4.80	Gavorrano, Tuscany, Italy.	A. Martelli.	A. Martelli, Rend. Ac. Linc., XVIII (2), p. 666, 1909.	Granite.	
214	I.4.1.3''.	Q 28.50 hy 0.66 or 38.77 an 1.39 C 0.61	Monte Capanne, Elba.	E. Manasse.	E. Manasse, Mem. Soc. Tosc. Sc. Nat., XVII, p. 224, 1900.	Tourmaline aplite.	Not in W. T.
215	I''4.1''3(4).	Q 26.76 hy 6.39 or 25.02 il 0.15 ab 37.20 an 2.78 C 1.63	Pietre Cotte, Vulcano, Aeolian Islands.	Pisani.	A. Lacroix, C. R., CXLVII, p. 1454, 1908.	Rhyolite obsidian.	

CLASS I. PERSALANE—Continued.

RANG I. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
216	71.60	13.05	0.92	1.26	0.69	1.94	4.65	4.90	0.62		0.14				99.77	
A3. III	1.193	.128	.006	.018	.017	.035	.075	.052			.002					
217	71.41	13.30	n. d.	2.40	0.85	2.63	4.30	4.57	0.12			0.25			99.83	
A4. IV	1.190	.130	—	.033	.021	.046	.069	.049				.002				
218	74.37	12.65	2.58	n. d.	0.20	1.22	3.87	4.57	0.22	0.02					99.70	
A4. IV	1.240	.124	.016	(.032)	.005	.021	.063	.049								
219	74.61	12.68	0.09	1.36	0.21	0.69	3.68	4.77	1.37	0.04	0.08				99.58	
A3. III	1.244	.124	.001	.019	.005	.013	.060	.051			.001					
220	73.09	13.80	1.28	0.68	0.37	0.69	3.77	5.36	0.60	0.72	0.38	0.07	trace	CO ₂ none ZrO ₂ 0.02 SO ₃ none BaO none	100.83	
A1. I	1.218	.135	.008	.010	.009	.013	.061	.057			.005	—	—			
221	70.50	14.28	0.75	1.22	0.49	1.00	3.62	5.28	2.86	0.10	0.47	0.11	0.04		100.72	
A2. II	1.175	.140	.005	.017	.012	.018	.058	.056			.006	.001	—	CO ₂ none		
222	74.76	11.60	3.50	0.19	0.18	0.07	4.35	4.92	0.64		trace	trace			100.21	
A3. III	1.246	.114	.022	.003	.005	.001	.070	.052			—	—				
223	74.09	10.88	3.35	0.42	0.30	0.16	4.56	4.45	1.52						99.73	
A3. III	1.235	.107	.021	.006	.008	.003	.074	.048								
224	73.23	12.25	3.25	0.28	0.13	0.25	4.44	4.32	1.74						99.89	
A3. III	1.221	.120	.020	.004	.003	.005	.072	.046								
225	73.35	13.08	3.06	n. d.	0.08	0.08	4.68	4.99	1.00						100.32	
A4. IV	1.223	.128	.019	—	.002	.001	.076	.053								
226	71.81	14.44	2.77	n. d.	none	0.60	3.37	6.08	1.00		0.23				100.30	
A4. IV	1.197	.142	.018	(.036)	—	.011	.055	.065			.003					
227	71.23	14.51	1.56	1.27	0.04	none	4.50	5.86	0.43		0.42				99.82	
A3. III	1.187	.142	.010	.018	.001	—	.073	.063			.005					
228	71.21	14.95	1.81	n. d.	0.15	0.63	3.97	5.83	1.13		0.20				99.88	
A4. IV	1.187	.147	.001	(.022)	.004	.011	.065	.062			.003					
229	76.74	11.12	1.00	0.78	0.19	0.82	3.35	5.87	0.19		0.05				100.11	
A3. III	1.279	.109	.006	.014	.005	.014	.054	.063			—					
230	76.10	12.90	n. d.	0.81	0.27	0.63	3.88	4.63	0.44		0.07				99.83	
A3. III	1.268	.126	—	.011	.007	.011	.063	.049			.001					
231	75.46	12.05	1.11	0.99	0.25	1.16	2.99	5.53	0.97						100.51	
A3. III	1.258	.118	.007	.014	.006	.021	.048	.059								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODI POTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
216	I''4.1.3''.	Q 22.08 di 6.15 or 28.91 wo 0.81 ab 39.30 mt 1.39 an 0.28 il 0.30	Eruption 1888-89, Vulcano, Aeolian Islands.	Pisani.	A. Lacroix, C. R., CXLVII, p. 1454, 1908.	Rhyolite.	
217	I(II).4.1''3.	Q 22.62 di 6.34 or 27.24 hy 3.24 ab 36.15 ap 0.67 an 3.34	Monte Lentia, Vulcano, Aeolian Islands.	Pisani.	A. Lacroix, C. R., CXLVII, p. 1454, 1908.	Rhyolite.	
218	I''4.1(2).3.	Q 29.88 di 2.20 or 27.24 hy 3.57 ab 33.01 an 3.34	Forgia Vecchia, Lipari, Aeolian Islands.	F. Glaser.	A. Bergeat, Abh. Münch. Ak., XX, p. 111, 1899.	Obsidian.	In W. T., p. 153.
219	I''4.1(2).3.	Q 31.80 hy 2.74 or 28.36 mt 0.23 ab 31.44 il 0.15 an 3.61	Conca Cannas, Monte Arci, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVI, p. 582, 1913.	Obsidian.	Mt omitted from norm in ref.
220	I.4.1''3.	Q 28.50 hy 0.90 or 31.69 mt 1.16 ab 31.96 il 0.76 an 3.61 hm 0.48 C 0.41	Capanna, n. Marubbiu, Monte Arci, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVI, p. 582, 1913.	Liparite.	Mt omitted from norm in ref.
221	I.4.1(2).3.	Q 26.58 hy 1.99 or 31.14 mt 1.15 ab 30.39 il 0.91 an 4.17 ap 0.34 C 1.12	Punta Brenta, n. Uras, Monte Arci, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVI, p. 582, 1913.	Perlite.	Mt omitted from norm in ref.
222	I''''4.1.3.	Q 31.44 ac 3.70 or 28.91 di 0.22 ab 32.49 wo 0.46 mt 0.70 hm 1.76	Comende, San Pietro Island, Sardinia.	M. Dittrich.	H. Rosenbusch, Elem. Geste., p. 257, 1898.	Comendite.	In W. T., p. 153.
223	I(II).(3)4.1.3.	Q 31.32 ac 6.93 or 26.69 di 0.65 ab 30.92 hy 0.50 mt 1.39	Guardia dei Mori, San Pietro, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. Wiss., Anh. No. 2, p. 22, 1912.	Comendite.	Also in N.J.C.B. 1912, p. 738.
224	I''4.1.3(4).	Q 30.18 di 0.65 or 25.58 mt 0.93 ab 37.73 hm 2.56 an 0.56	Canale del Baccio, San Pietro, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. Wiss., Anh. No. 2, p. 22, 1912.	Comendite.	Also in N.J.C.B. 1912, p. 738.
225	I.4.1.3''.	Q 26.88 ac 0.46 or 29.47 di 0.22 ab 39.30 hy 0.10 hm 4.18	Cala Lunga, San Antioco, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. Wiss., Anh. No. 2, p. 22, 1912.	Comendite.	Also in N.J.C.B. 1912, p. 738.
226	I.4.1''3.	Q 25.98 hy 4.36 or 36.14 il 0.46 ab 28.82 di 0.65 an 3.06 C 1.12	Roccadella Guardia, San Antioco, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. Wiss., Anh. No. 2, p. 33, 1912.	Liparite.	Also in N.J.C.B. 1912, p. 738.
227	I.4.1.3.⊙	Q 22.02 hy 0.50 or 35.03 mt 2.32 ab 38.25 il 0.76 C 0.61	Calasetta, San Antioco, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. Wiss., Anh. No. 2, p. 28, 1912.	Liparite.	Also in N.J.C.B. 1912, p. 738.
228	I.4.1''3.	Q 22.80 hy 2.78 or 34.47 il 0.46 ab 34.06 an 3.06 C 0.92	Sisimieddu, San Antioco, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. Wiss., Anh. No. 2, p. 33, 1912.	Liparite.	Also in N.J.C.B. 1912, p. 738.
229	I''(3)4.1''3.	Q 33.96 ac 2.77 or 35.03 ns 0.24 ab 24.10 di 3.38 hy 0.90	Capo Bellavista, Sardinia.	C. Riva.	C. Riva, Att. Ac. Sc. Nap., (2), XII, No. 9, p. 40, 1905.	Quartz porphyry.	
230	I(3)4.1''3''.	Q 33.42 hy 1.92 or 27.24 il 0.15 ab 33.01 an 3.06 C 0.31	Capo Bellavista, Sardinia.	C. Riva.	C. Riva, Att. Ac. Sc. Nap., (2), XII, No. 9, p. 39, 1905.	Quartz porphyry.	
231	I(3)4.1''3.	Q 34.26 di 2.32 or 32.80 hy 0.36 ab 25.15 mt 1.62 an 3.06	Southern Ural Mountains, Russia.	Not stated.	A. Ginsberg, Ann. Inst. Polyt. St. Pet., XV, p. 211, 1911.	Rapakivi granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
232	75.35	12.46	1.14	1.03	trace	0.69	3.08	5.41	0.71	0.27					100.14	
A3. III	1.256	.122	.007	.014	—	.013	.050	.057								
233	69.91	13.76	2.17	1.23	0.46	1.39	4.45	6.33	0.12	none	0.16	0.11	trace	CO ₂ none	100.09	
A2. II	1.165	.135	.014	.017	.012	.025	.072	.067			.002	.001	—			
234	74.13	13.88	0.96	0.75	0.15	0.92	4.68	5.01	n. d.		trace	trace	0.18	Cl 0.09	100.48	2.349
A3. III	1.236	.136	.006	.010	.004	.016	.075	.053			—	—	.003			
235	73.72	13.07	0.29	1.28	0.22	2.10	4.58	5.01	n. d.		trace		0.52		110.79	
A3. III	1.229	.128	.002	.018	.006	.038	.074	.053			—		.007			
236	76-82	12.46	1.06	n. d.	0.05	1.35	2.85	5.71	0.24						100.54	
A4. IV	1.280	.122	.007	(.014)	.001	.024	.046	.061								
237	75.25	11.60	0.78	3.00	0.39	0.70	3.98	4.20	n. d.		0.19				100.09	
A3. III	1.254	.114	.005	.042	.010	.013	.065	.044			.002					
238	73.55	12.20	2.75	0.26	0.90	1.08	3.74	4.90	0.63		0.18				100.15	
A3. III	1.226	.120	.017	.004	.023	.019	.060	.052			.002					
239	71.95	11.95	4.08	0.53	0.99	0.42	4.51	4.79	0.75		0.42				100.39	
A3. III	1.199	.117	.026	.007	.025	.007	.073	.051			.005					
240	71.70	13.26	0.08	1.90	0.40	3.02	4.72	4.74	0.58		0.50	0.04			100.94	
B2. III	1.195	.130	.001	.026	.010	.054	.076	.050			.006	—				
241	73.02	11.50	1.98	2.31	0.11	0.34	4.85	4.64	0.59		0.57	0.14			100.05	2.627
A2. II	1.217	.113	.013	.032	.003	.006	.078	.049			.007	.001				
242	73.9	13.6	1.4	0.5	0.3	0.4	4.4	4.4	0.5		0.2				99.6	
B3. IV	1.232	.133	.009	.007	.008	.007	.071	.047			.003					
243	71.7	14.0	0.6	1.1	0.3	1.0	6.0	4.9	0.2						100.3	
B3. IV	1.195	.137	.004	.015	.008	.018	.097	.052								
244	74.19	13.55	0.46	n. d.	0.28	0.94	5.68	4.82	0.40			trace			100.32	
A3. III	1.237	.133	.003	(.006)	.007	.017	.092	.051				—				
245	72.46	13.96	1.65	0.89	trace	0.81	5.69	5.16	0.17						100.79	
A3. III	1.208	.137	.010	.013	—	.014	.092	.055								
246	76.01	11.96	2.06	n. d.	trace	0.26	4.46	4.73	0.28				trace		99.76	2.58
A4. IV	1.267	.117	.013	(.016)	—	.004	.072	.050					—			
247	76.0	12.7	2.1	0.6	none	0.2	4.0	4.2	1.1						100.9	2.59
B3. IV	1.267	.125	.013	.008	—	.004	.065	.045								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
232	I.(3)4.1(2).3.	Q 34.86 hy 0.92 or 31.69 mt 1.62 ab 26.20 an 3.61 C 0.20	Southern Ural Mountains, Russia.	Not stated.	A. Ginsberg, Ann. Inst. Polyt. St. Pet., XV, p. 211, 1911.	Rapakivi granite.	
233	I''4.1.3.	Q 18.00 ac 1.85 or 37.25 di 3.83 ab 35.63 wo 0.58 mt 2.32 il 0.30 ap 0.34	Miask, Ural Mountains, Russia.	H. S. Washing- ton.	L. V. Pirsson, A. J. S., XIII, p. 180, 1902.	Aegirite granite.	
234	I.4.1.3''.	Q 25.98 di 1.89 or 29.47 hy 0.33 ab 39.30 mt 1.39 an 2.22	Kotan Dag, Caucasus.	A. Dannen- berg.	A. Dannenberg, T. M. P. M., XXXIII, p. 30, 1904.	Obsidian.	
235	I''4.1.3''.	Q 23.94 di 7.00 or 29.47 wo 0.93 ab 38.77 mt 0.46 an 0.28	Cumpna Mare, Arges Valley, Carpathian Moun- tains, Rumania.	W. T. Saidel.	M. Reinhard, In. Diss. Zür., p. 89, 1906.	Aplite.	Center of dike. Cf. No. 48, II. 4.2.3.
236	I.(3)4.1(2).3.	Q 35.04 di 2.20 or 33.92 hy 0.79 ab 24.10 an 4.17	Cap Marsa, n. Menerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, p. 77, 1900.	Liparite.	In W. T., p. 153.
237	I''.(3)4.1.3(4).	Q 32.22 di 1.92 or 24.46 hy 4.63 ab 34.06 mt 1.16 an 1.39 il 0.30	Gouré, Zinder Ter- ritory, n. Sokoto, Fr. Nigeria.	Pisani.	A. Lacroix, C. R., CXL, p. 24, 1905.	Microgranite (Paisanite).	
238	I''4.1.3.	Q 30.24 di 2.38 or 28.91 hy 1.20 ab 31.44 mt 0.46 an 2.22 il 0.30 hm 2.40	Zinder, n. Lake Chad, Fr. Nigeria.	Pisani.	Gentil and Freydenberg, C. R., CXLVI, p. 354, 1908.	Riebeckite granite.	
239	I(II).4.1.3.	Q 26.22 ac 3.23 or 28.36 di 1.51 ab 34.58 hy 1.80 mt 0.46 il 0.78 hm 2.72	Hadjer el Khemis, n. Lake Chad, Fr. Nigeria.	Pisani.	Gentil and Freydenberg, C. R., CXLVI, p. 354, 1908.	Riebeckite rhyolite.	
240	I(II).4.1.3(4).	Q 21.12 di 6.87 or 27.30 wo 2.44 ab 39.82 mt 0.23 an 1.11 il 0.91	Kil. 176, Konakry- Niger R. R., French Guinea.	Pisani?	Col. Azema, C. R., Cong. Soc. Sav. 1912, p. 111.	Granite.	
241	I(II).4.1.3''.	Q 27.30 ac 6.01 or 27.24 ns 0.12 ab 33.54 di 0.75 hy 3.20 il 1.06 ap 0.34	Mungo Rapids, Kamerun.	A. Lindner.	A. Hintze, Jb. Pr. G., L.-A., XXVIII, p. 340 (1907), 1910.	Grogrudite.	
242	I''4.1''3(4).	Q 30.12 hy 0.80 or 26.13 mt 0.93 ab 37.20 il 0.46 an 1.95 hm 0.80 C 0.82	Gebel Doukhan, Red Sea, Egypt.	Not stated.	Couyat, C. R., CXLVII, p. 869, 1908.	Granite.	
243	I''4.1.3(4).	Q 18.84 ac 1.85 or 28.91 ns 0.98 ab 44.54 di 4.08 il 1.39	Gebel Doukhan, Red Sea, Egypt.	Not stated.	Couyat, C. R., CXLVII, p. 869, 1908.	Granite.	
244	I.4.1.3(4).	Q 23.76 ac 1.39 or 28.36 ns 0.85 ab 42.97 di 1.51 wo 1.16	Adi Enfi, Eritrea.	E. Manasse.	E. Manasse, Stud. Petr. Erit., p. 52, 1909.	Granite.	
241	I''4.1.3(4).	Q 19.14 ac 4.62 or 30.58 di 3.35 ab 42.97	Alid Volcano, Buia, Eritrea.	E. Manasse.	E. Manasse, Stud. Petr. Erit., p. 114, 1909.	Obsidian.	
246	I''4.1.3.	Q 31.50 ac 2.31 or 27.80 di 0.99 ab 35.10 hy 1.58	Mount Scholoda, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 264, 1900.	Paisanite.	In W. T., p. 153.
247	I.(3)4.1.3''.	Q 35.94 mt 1.86 or 25.02 hm 0.80 ab 34.06 an 1.11 C 1.12	Helabala, n. Djibouti, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est Afr., p. 75, 1906.	Rhyolite.	Also in C. R., CXXXVII, p. 878, 1903.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
248	72.9	12.4	3.0	2.4	0.5	0.1	4.4	4.3	0.4						100.4	2.46
B3. IV	1.215	.122	.019	.033	.013	.002	.071	.046								
249	71.7	14.2	1.6	1.6	0.4	none	3.8	4.6	2.2						100.1	2.42
B3. IV	1.195	.139	.010	.022	.010	—	.061	.049								
250	71.4	11.8	5.6	1.4	0.6	0.2	4.2	4.3	1.4						100.9	2.49
B3. IV	1.190	.116	.035	.019	.015	.004	.063	.046								
251	71.75	13.04	2.24	0.47	0.44	0.74	3.52	5.35	0.47	0.27	1.18	0.23			99.70	
A2. II	1.196	.128	.014	.007	.011	.013	.056	.057			.015	.002				
252	69.95	11.99	0.76	0.64	0.09	0.66	3.70	3.80	4.98	2.80	0.18	0.09			99.64	
A2. II	1.166	.118	.005	.009	.002	.012	.060	.040			.002	—				
253	69.71	14.68	1.09	1.48	0.34	1.11	4.36	5.67	0.44	0.30	0.47	0.08			99.73	
A2. II	1.162	.144	.007	.021	.009	.020	.070	.061			.006	—				
254	62.73	15.42	5.65	0.83	0.64	0.40	4.38	5.72	1.36	0.97	1.41	0.24			99.75	
A2. II	1.046	.151	.036	.012	.016	.007	.071	.061			.018	.002				
255	71.41	13.94	0.63	0.78	0.09	0.62	3.75	4.74	4.09	0.34	0.01	trace	0.09	Ce ₂ O ₃ trace	100.49	
A2. II	1.190	.137	.004	.011	.002	.011	.061	.050			—	—	.001			
256	75.13	12.03	1.01	0.70	0.17	1.27	3.44	5.48	0.29	0.29					99.81	2.603
A3. III	1.252	.118	.006	.010	.004	.023	.055	.059								
257	73.96	13.64	0.78	1.72	trace	trace	2.82	6.52	0.64		trace			Li ₂ O 0.10	100.18	
A3. III	1.233	.134	.005	.024	—	—	.045	.069			—					
258	72.25	13.97	0.76	1.90	trace	0.63	2.77	6.58	0.31					Li ₂ O trace	99.21	
B3. IV	1.204	.137	.005	.026	—	.011	.045	.070								
259	70.96	15.65	0.81	1.93	0.86	0.84	3.28	5.04	0.48				0.13		99.98	
A3. III	1.183	.153	.005	.026	.022	.015	.053	.053					.002			
260	75.44	11.98	0.88	1.02	0.10	0.33	4.06	5.01	0.68	0.13	trace		trace	CO ₂ none	99.63	
A3. III	1.257	.117	.006	.014	.003	.004	.065	.054			—		—			
261	72.19	11.25	4.47	0.83	0.54	2.32	3.89	4.26	n. d.						99.75	
A3. III	1.203	.110	.028	.011	.014	.041	.063	.046								
262	71.23	14.59	1.98	0.65	0.16	1.20	3.85	6.49	n. d.						100.15	
A3. III	1.187	.143	.013	.009	.004	.021	.062	.069								
263	75.34	11.72	0.52	1.52	0.34	0.49	3.60	5.59	0.70		trace				99.72	2.64
A3. III	1.256	.115	.003	.021	.009	.009	.058	.060			—					
264	73.29	12.94	2.63	n. d.	0.58	0.86	3.25	5.71	0.82		trace	trace		CO ₂ 0.43	100.51	2.63
A4. IV	1.222	.127	.016	(.032)	.015	.015	.053	.061			—	—				

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
248	I''4.1.3(4).	Q 28.92 hy 3.15 or 25.58 mt 4.41 ab 37.20 an 0.56 C 0.31	Tcheffedonza, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est Afr., p. 75, 1906.	Pantellerite.	Also in C. R., CXXXVII, p. 878, 1903. (SiO ₂ correct here.)
249	I''4.1.3.	Q 30.78 hy 2.58 or 27.24 mt 2.32 ab 31.96 C 2.96	Baldji, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est Afr., p. 75, 1906.	Pantellerite obsidian.	Also in C. R., CXXXVII, p. 878, 1903.
250	I''4.1.3(4).	Q 29.10 di 0.53 or 25.58 hy 1.30 ab 35.63 mt 4.41 an 0.56 hm 2.56	Moullou, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est Afr., p. 75, 1906.	Pantellerite.	Also in C. R., CXXXVII, p. 878, 1903.
251	I''4.1.3.	Q 29.70 hy 1.10 or 31.69 il 1.06 ab 29.34 hm 2.24 an 1.67 ru 0.64 C 0.92 ap 0.67	Kizomohitalko, Sakalave Region, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Microgranite.	
252	I.(3)4.1(2).3(4).	Q 32.28 hy 0.46 or 22.24 mt 1.16 ab 31.44 il 0.30 an 3.34 C 0.61	Ampasibitika, Sakalave Region, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Pitchstone.	
253	I.4.1''3.	Q 20.34 di 1.61 or 33.92 hy 1.16 ab 36.68 mt 1.62 an 3.61 il 0.91	Mount Antatrotro, Madagascar.	Boiteau?	A. Lacroix, pers. com.	Rhyolite.	
254	I(II).4''1.3.	Q 14.28 hy 1.60 or 33.92 il 1.82 ab 37.20 hm 5.65 C 1.94 ru 0.48 ap 0.67	Bekodia, Sakalave Region, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Trachyte.	
255	I''4.1''3.	Q 29.52 hy 1.26 or 27.80 mt 0.93 ab 31.96 an 3.06 C 1.53	Manwan Creek, Lebombo Range, Zululand.	G. T. Prior.	G. T. Prior, Ann. Natal Mus., II, No. 2, p. 154, 1910.	Rhyolite.	
256	I''4.1.3.	Q 31.98 di 1.86 or 32.80 wo 1.28 ab 28.82 mt 1.39 an 1.11	Tatarka River, Jenissei District, Siberia.	Not stated.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 172, 1910.	Aplite.	
257	I''4.1.(2)3.	Q 31.80 hy 2.51 or 38.36 mt 1.16 ab 23.58 C 2.04	Angara River, Jenissei District, Siberia.	B. Karpov.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 189, 1910.	Granite.	Center of dike. Cf. No. 26, I.3.1.2.
258	I.4.1.(2)3.	Q 28.26 hy 2.77 or 38.92 mt 1.16 ab 23.58 an 3.06 C 1.12	Angara River, Jenissei District, Siberia.	B. Karpov.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 193, 1910.	Granite.	Liegendes Salband. Cf. No. 26, I.3.1.2; No. 257, I.4.1.3.
259	I''4.1(2).3.	Q 28.32 hy 5.24 or 29.47 mt 1.16 ab 27.77 an 4.17 C 3.26	Angara River, Jenissei District, Siberia.	A. A. Semen- chenko.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 172, 1910.	Granite.	
260	I''4.1.3.	Q 31.80 ac 0.92 or 30.02 di 0.96 ab 33.81 hy 1.12 mt 0.93	Iskagan Bay, East Cape, Siberia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XIII, p. 180, 1902.	Comendite.	
261	I(II)''4.1.3''.	Q 29.58 di 3.03 or 25.58 wo 3.02 ab 33.01 mt 2.55 an 0.28 hm 2.72	Kara Tioubé, n. Samarkand, Turkestan.	Not stated.	K. I. Timofeef, Ann. G. Min. Russ., XII, p. 82, 1910.	Granite porphyry.	
262	I.4.1''3.	Q 21.84 di 0.86 or 38.36 wo 0.58 ab 32.49 mt 2.09 an 3.34 hm 0.04	Kara Tioubé, n. Samarkand, Turkestan.	Not stated.	K. I. Timofeef, Ann. G. Min. Russ., XII, p. 82, 1910.	Granite.	
263	I''4.1.3.	Q 30.90 ac 1.39 or 33.36 di 2.13 ab 28.82 hy 2.53	Camp. XIII, Peishan Range, Manchuria.	M. Dittrich.	K. Futterer, Durch Asien, II, (1), p. 329, 1905.	Quartz porphyry	
264	I.4.1''3.	Q 27.78 di 0.49 or 33.92 hy 5.46 ab 27.77 an 3.61	Yung-chang-hsien, Nanshan Moun- tains, Kwangsi, China.	C. Pfeil.	K. Futterer, Durch Asien, II, (2), p. 29, 1905.	Quartz porphyry.	

CLASS I. PERSALANE—Continued.

RANG I. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
265	72.21	11.20	2.25	2.66	0.08	0.27	4.29	4.81	1.45		0.44	0.10	0.10		99.86	
A2. II	1.204	.110	.014	.037	.002	.005	.069	.051			.006	.001	.001			
266	70.57	15.15	1.87	0.16	0.16	0.50	4.48	6.04	0.97		0.40	0.09	trace		100.39	
A2. II	1.176	.149	.012	.002	.004	.009	.073	.064			.005	.001				
267	67.51	13.69	1.68	2.83	0.18	0.61	4.65	5.45	2.77		0.53	0.05	0.01		99.96	
A2. II	1.125	.134	.011	.039	.005	.011	.075	.058			.007	—	—			
268	64.51	14.18	3.42	2.81	0.21	1.49	4.37	5.75	2.48		0.59	0.05	0.03		99.89	
A2. II	1.075	.139	.021	.039	.005	.027	.071	.062			.007	—	—			
269	75.28	14.24	n. d.	0.13	0.20	0.90	3.60	5.10	0.41		0.12	0.11			100.09	
A2. II	1.255	.140	—	.002	.005	.016	.058	.054			.002	.001				
270	74.12	13.66	0.48	0.63	0.41	0.88	3.15	5.34	0.76		0.09	0.20			99.72	
A2. II	1.235	.134	.003	.009	.010	.016	.051	.056			.001	.001				
271	72.0	14.9	0.3	0.2	0.3	0.8	4.1	4.2	2.7						99.5	
B3. IV	1.200	.146	.002	.003	.008	.014	.066	.045								
272	75.62	11.50	n. d.	1.39	0.39	1.95	3.17	4.68	1.65						100.35	
A4. IV	1.260	.113	—	.019	.010	.035	.052	.050								
273	74.20	11.75	1.92	1.30	0.30	0.19	4.25	5.00	0.27	0.06	0.13	none	0.02	CO ₂ 0.01 ZrO ₂ 0.38 Cl 0.17 F 0.02 S 0.10 NiO 0.03 BaO, SrO no.	100.12	2.62
A1. I	1.237	.115	.012	.018	.008	.003	.069	.053			.002	—	—			
274	72.38	12.21	3.36	0.69	0.17	0.18	3.52	5.20	0.86	0.69	0.25	trace	0.70	Cl 0.01 NiO 0.04 BaO none SrO none Li ₂ O none	100.26	2.47
A1. I	1.206	.120	.021	.010	.004	.003	.056	.055			.003	—	.010			
275	74.10	12.08	2.02	0.86	0.64	1.10	3.32	4.98	0.81	0.34	0.21	0.07	0.05		100.58	2.50
A2. II	1.235	.118	.013	.012	.016	.020	.053	.053			.003	—	—			
276	73.52	11.05	none	3.15	1.03	1.70	4.08	3.99	0.44	0.16	0.20	0.15			99.47	
A2. II	1.225	.109	—	.044	.026	.030	.066	.043			.003	.001				
277	73.10	13.09	1.19	1.43	0.43	0.87	4.03	4.92	0.54	none	0.39	0.11	none		100.10	2.38
A2. II	1.218	.128	.007	.019	.011	.016	.065	.052			.005	.001				
278	72.35	10.96	2.60	1.50	0.17	1.03	3.26	4.87	3.50	0.35	none	0.09	0.03		100.71	2.39
A2. II	1.206	.108	.016	.021	.004	.018	.053	.052			—	—	—			
279	76.52	12.73	0.48	0.62	0.14	0.75	3.58	4.59	0.37	0.17	0.07	0.02	0.12	CO ₂ 0.04 ZrO ₂ none SO ₂ none Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO none SrO trace Li ₂ O trace Cu trace	100.20	
A1. I	1.275	.125	.003	.009	.004	.013	.058	.049			.001	—	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
265	I(II)''4.1.3.	Q 28.32 ac 4.62 or 28.36 di 0.49 ab 30.92 hy 3.63 mt 0.93 il 0.91 ap 0.34	Iibi, Dogo, Oki Islands, Japan.	K. Yokoyama	S. Kozu, Sci.Rep.Tohoku Un., (2), I, p. 37, 1913.	Comendite.	
266	I.4.1.3.⊙	Q 20.28 hy 0.40 or 35.58 il 0.30 ab 38.25 hm 1.87 an 1.67 ru 0.24 C 0.61 ap 0.34	Terayama, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sci.Rep.Tohoku Un., (2), I, p. 42, 1913.	Rhyolite.	
267	I''4.1.3''.	Q 17.40 di 2.67 or 32.25 hy 1.88 ab 39.30 mt 2.55 il 1.06	Nakamura, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sci.Rep.Tohoku Un., (2), I, p. 39, 1913.	Comendite.	
268	I(II).4''1.3.	Q 13.68 di 3.41 or 34.47 wo 0.58 ab 37.20 mt 4.87 an 1.67 il 1.06	Utagi, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sci.Rep.Tohoku Un., (2), I, p. 45, 1913.	Trachyte.	
269	I.''4.1(2).3.	Q 33.12 hy 0.50 or 30.02 il 0.30 ab 30.39 ap 0.34 an 3.61 C 1.53	Lau Alas, Sumatra.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 52, 1909.	Border of schlieren in granite.	Cf. No. 270 below and No. 48. II. 4. 2. 4.
270	I.(3)4.1(2).3.	Q 33.12 hy 1.66 or 31.14 mt 0.70 ab 28.72 il 0.15 an 3.61 ap 0.34 C 1.43	Lau Alas, Sumatra.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 50, 1909.	Granite.	
271	I.''4.1(2).3''.	Q 29.62 hy 0.93 or 25.02 mt 0.46 ab 34.58 an 3.89 C 2.14	Manindjan Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 52, 1903.	Pumice.	
272	I''.(3)4.1(2).3.	Q 34.26 di 5.81 or 27.80 hy 0.60 ab 27.25 an 3.06	Embonang Falls, Taisouti River, Hiton, Ambon Island, Moluccas.	D. Funk.	R. D. M. Verbeek, Jaarb. Mijaw., XXXIV, p. 230, 1905.	Liparite ("ambonite")	French ed., p. 243.
273	I''''4.1.3.	Q 30.24 ac 2.31 or 29.47 di 0.71 ab 32.49 hy 1.62 il 0.23 mt 1.62 Z 0.55 il 0.30	Mount Conowrin, Glass House Mountains, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 168, 1906.	Comendite.	
274	I.''4.1.3.	Q 31.80 hy 0.40 or 30.58 mt 3.94 ab 29.34 il 0.46 an 0.83 hm 0.64 C 0.61	Ngun-Ngun, Glass House Mountains, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 168, 1906.	Pantellerite.	
275	I.(3)4.1(2).3.	Q 33.06 di 1.73 or 29.47 hy 0.80 ab 27.77 mt 2.09 an 3.34 il 0.46 hm 0.64	Mount Barney, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Rhyolite.	H. C. Richards, pers. com.
276	I(II)''4.1.3(4).	Q 28.62 di 6.37 or 23.91 hy 4.77 ab 34.58 il 0.46 ap 0.31	Enoggera, n. Brisbane, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Granite.	H. C. Richards, pers. com.
277	I.4.1''3.	Q 28.44 di 0.46 or 28.91 hy 1.79 ab 34.06 mt 1.62 an 3.06 il 0.76 ap 0.34	Springbrook, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Rhyolite.	H. C. Richards, pers. com.
278	I''.(3)4.1.3.	Q 32.76 di 2.10 or 28.91 wo 0.70 ab 27.77 mt 3.71 an 0.83	Mount Lindsay, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Pitchstone.	H. C. Richards, pers. com.
279	I.(3)4.1(2).3.	Q 35.70 hy 1.32 or 27.24 mt 0.70 ab 30.39 il 0.15 an 3.61 C 0.61	Ruby Parish, Buller County, New South Wales.	W. A. Greig.	J. E. Carne, N. S. W. G. S., Min. Res., 14, p. 85, 1911.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
280	76.28	11.41	1.60	0.72	0.15	0.62	3.97	4.54	0.40	0.16	0.20	0.17	0.06	CO ₂ 0.04 ZrO ₂ none SO ₃ none Cl none F none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO none SrO trace	100.32	
A1, I	1.271	.112	.010	.010	.004	.011	.065	.048			.003	.001	—			
281	76.10	11.60	0.15	1.48	0.54	1.39	3.76	4.03	0.32	0.18	0.20	0.12	0.03	CO ₂ 0.36 SrO trace Li ₂ O trace	100.26	2.626
A2, II	1.268	.114	.001	.021	.014	.025	.061	.043			.003	.001	—			
282	74.74	13.57	1.20	0.27	0.32	0.26	3.89	4.48	0.57	0.26	0.36	0.05	trace	CO ₂ 0.02 ZrO ₂ none Cl trace S none Cr ₂ O ₃ none NiO none BaO 0.05 SrO trace V ₂ O ₅ none Li ₂ O none	100.04	2.604
A1, I	1.246	.133	.008	.004	.008	.005	.063	.048			.005	—	—			
283	74.50	13.72	0.69	0.90	0.44	0.52	3.47	5.13	0.26	0.18	0.17	0.27	0.03	CO ₂ 0.04 ZrO ₂ none SO ₃ none Cl trace S 0.07 Cr ₂ O ₃ none NiO none BaO 0.05 SrO none	100.44	2.693
A1, I	1.242	.134	.004	.013	.011	.009	.056	.054			.002	.002	—		(100.35)	
284	74.12	12.39	0.31	0.21	0.42	0.30	3.22	5.07	2.17	2.22		trace	trace	SO ₃ trace	100.43	
A3, III	1.235	.121	.002	.003	.011	.005	.052	.055				—	—		(100.33)	
285	73.68	15.06	0.68	0.54	0.26	0.54	3.36	5.45	0.28	0.18	0.16	0.11	0.07	CO ₂ 0.01 ZrO ₂ none SO ₃ none Cl F none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.04 SrO trace Li ₂ O none	100.42	2.658
A1, I	1.228	.147	.004	.007	.007	.010	.054	.058			.002	.001	.001			
286	73.93	12.19	1.80	0.99	0.44	0.76	3.32	4.95	1.13	0.15	0.10	0.05	0.04	ZrO ₂ none SrO trace Li ₂ O trace	100.05	2.645
A2, II	1.232	.120	.011	.014	.011	.014	.053	.053			.001	—	—			
287	67.68	13.99	3.20	1.98	0.34	0.84	5.30	4.87	1.05	0.65	0.20	0.04	0.02	CO ₂ 0.02 ZrO ₂ none SO ₃ none Cl trace Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO none SrO trace Li ₂ O trace	100.18	2.617
A1, I	1.118	.137	.020	.028	.009	.015	.085	.052			.003	—	—			
288	75.74	12.45	1.02	n. d.	0.08	1.00	2.91	6.77	0.33						100.30	2.635
A3, III	1.262	.122	.006	(.012)	.002	.018	.047	.072								
289	73.30	13.84	0.82	1.22	0.82	0.84	3.12	4.89	0.50	0.19	0.20	0.08	0.15	SO ₃ none Cl none NiO none Li ₂ O none	99.97	
A1, I	1.222	.136	.005	.017	.021	.015	.050	.052			.003	—	.002			
290	62.56	17.89	4.98	0.45	0.18	0.72	5.06	5.13	0.73	1.30	0.38	0.11	trace	SO ₃ trace Cl none Li ₂ O trace	99.49	2.504
A2, II	1.043	.175	.031	.007	.005	.013	.082	.054			.005	.001				
291	72.30	14.64	1.21	0.24	0.32	0.32	4.38	6.04	0.24	0.20	0.36	0.04	0.11	CO ₂ 0.10 Cl 0.03 FeS ₂ 0.15	100.68	
A1, I	1.205	.142	.008	.003	.008	.003	.071	.064			.005	—	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
280	I.(3)4.1.3''.	Q 34.98 ac 0.46 or 26.69 hy 0.86 ab 33.54 wo 0.46 mt 1.62 il 0.46 hm 0.32 ap 0.34	Middle Creek, Tingha District, New South Wales.	H. P. White.	J. E. Carne, N. S. W. G. S., Min. Res., 14, p. 63, 1911.	Granite.	
281	I.(3)4.1''.3''.	Q 31.86 di 2.81 or 23.91 hy 3.22 ab 31.96 mt 0.23 an 2.78 il 0.46 ap 0.34	Hillend, New South Wales.	W. G. Stone.	A. R. Dep. Min. N. S. W. (1911), 1912, p. 198.	Quartz felsite.	
282	I.(3)4.1.3''.	Q 33.72 hy 0.80 or 26.69 il 0.61 ab 33.01 hm 1.20 an 1.39 C 1.73	Mumbadah Creek, Lincoln County, New South Wales.	J. C. H. Min- gay.	A. R. Dep. Min. N. S. W. (1908), 1909, p. 184.	Aplitic granite.	
283	I.(3)4.1.3.	Q 33.60 hy 2.08 or 30.02 mt 0.93 ab 29.34 il 0.30 an 0.56 ap 0.67 C 2.24	Broken Hill, New South Wales.	J. C. H. Min- gay.	A. R. Dep. Min. N. S. W. (1909), 1910, p. 198.	Granite.	
284	I.(3)4.1.3.	Q 34.26 hy 1.23 or 30.58 mt 0.46 ab 27.24 an 1.39 C 0.92	Wantialable Creek, Gowen County, New South Wales.	J. C. H. Min- gay.	G. W. Card, Rec. G. S. N. S. W., IV, p. 116, 1895.	Trachyte.	In W. T., p. 153.
285	I.''4.1.3.	Q 31.98 hy 0.96 or 32.25 mt 0.93 ab 28.30 il 0.30 an 1.95 ap 0.34 C 2.86	Tenterfield, New England, New South Wales.	J. C. H. Min- gay.	E. C. Andrews, Rec. G. S. N. S. W., VIII (3), p. 200, 1907.	Granite.	
286	I.(3)4.1(2).3.	Q 33.30 hy 1.36 or 29.47 mt 2.55 ab 27.77 il 0.15 an 3.89	Rivertree, New South Wales.	W. A. Greig.	Dep. Min. N. S. W., A. R., (1912), p. 198, 1913.	Granite.	
287	I''4''.1.3(4).	Q 16.08 di 3.19 or 28.91 mt 4.64 ab 44.54 il 0.46	Dungarry Parish, Dubbo, New South Wales.	H. P. White.	A. R. Dep. Min. N. S. W., (1905), 1906, p. 165.	Trachyte.	
288	I.''4.1.(2)3.	Q 30.78 di 3.52 or 40.03 ab 24.63 an 0.83	Ensay, Omeo, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XXII, p. 97, 1886.	Aplite.	In W. T., p. 153
289	I.''4.1''.3.	Q 32.88 hy 3.55 or 28.91 mt 1.16 ab 26.20 il 0.46 an 4.17 C 1.94	Buffalo Mountains, Victoria.	P. G. W. Bay- ley.	D. V. Mahoney, Mem. G. S. Vict., No. 6, p. 8, 1908.	Granite.	
290	I''4(5).1''.3(4).	Q 12.12 hy 0.50 or 30.62 mt 0.46 ab 42.97 il 0.76 an 2.78 hm 4.64 C 2.96 ap 0.31	McAlisters Creek, Newnham, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict., B. 24, p. 25, 1912.	Trachyte.	
291	I.4.1.3.⊙	Q 22.62 hy 0.80 or 35.38 il 0.76 ab 37.20 hm 1.28 an 1.39 C 0.20	Minnipa Hill, South Australia.	W. S. Chap- man.	R. L. Jack, G. S. So. Aust., B. 1, p. 12, 1912.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
292	71.48	14.73	1.14	1.16	0.25	0.54	2.74	5.68	1.08	0.32	0.35	0.04	0.10	CO ₂ 0.12 Cl 0.04 FeS ₂ 0.14	99.91	
A1. I	1.191	.144	.007	.016	.006	.010	.044	.061			.004	—	.001			
293	76.15	11.78	0.94	1.59	0.42	0.30	3.99	4.23	0.46		0.15	0.19	0.08	CO ₂ none	100.28	
A2. II	1.269	.116	.006	.022	.011	.005	.065	.045			.002	.001	.001			
294	75.46	11.27	1.17	2.05	0.27	0.53	3.45	4.88	0.28	0.07	0.05	none	trace	CO ₂ none SO ₃ trace Cl trace	99.93	2.353
A2. II	1.258	.111	.008	.029	.007	.009	.056	.052			—	—	—			
295	75.05	14.74	0.16	0.34	0.05	0.78	4.32	4.02	0.41	0.20	0.07	0.04	01.0	CO ₂ none SO ₃ 0.07	100.37	
A2. II	1.251	.145	.001	.005	.001	.014	.069	.043			—	—	.001			
296	74.75	13.77	0.60	0.58	0.36	0.30	4.51	4.30	0.17	0.23	none	0.12	0.06	CO ₂ none	99.75	
A2. II	1.246	.135	.004	.008	.009	.005	.073	.046			—	.001	—			
297	72.85	13.79	1.32	0.87	0.53	0.90	2.77	5.61	0.95	0.10	0.12	0.35	0.01	CO ₂ none	100.17	
A2. II	1.214	.135	.008	.012	.013	.016	.045	.060			.002	.002	—			
298	73.55	13.19	0.89	1.49	0.37	0.96	4.45	4.32	0.37	0.04	0.23	none	0.10	CO ₂ none Cl trace NiO 0.01 Li ₂ O trace	99.97	2.376
A2. II	1.226	.129	.006	.021	.009	.017	.072	.046			.003	—	.001			
299	73.08	11.98	n. d.	2.12	0.23	1.93	3.58	6.57	0.29	0.23		0.01		Cl trace	100.02	
A4. IV	12.18	.118	(.010)	(.009)	.006	.034	.058	.070								

RANG 1. PERALKALIC. LIPARASE.

1	69.48	14.19	3.89	1.47	0.68	0.90	5.32	4.34	0.72				0.12		101.11	2.63
B3. IV	1.158	.139	.024	.020	.017	.016	.085	.046					.002			
2	65.89	19.73	2.03	0.75	0.27	0.46	6.59	3.95	0.34		none	none	trace	CO ₂ 0.44	100.45	
A2. II	1.098	.193	.013	.010	.007	.008	.106	.042				—	—			
3	76.70	12.98	0.25	n. d.	0.06	0.54	4.92	4.14	0.59		trace	0.31		CO ₂ trace	100.53	
A3. III	1.278	.127	.002	(.004)	.002	.010	.079	.044			—	.002				
4	69.90	16.78	0.47	2.00	0.48	0.74	4.84	3.64	0.78	0.28	0.39	0.09	0.06	CO ₂ 0.17	100.62	
A2. II	1.165	.164	.003	.028	.012	.013	.077	.038			.005	—	—			
5	77.00	13.60	0.41	n. d.	none	0.70	5.78	1.50	0.48	0.23	0.07	trace	none		99.77	
A3. III	1.283	.133	.003	(.006)	—	.013	.094	.016			.001	—	—			
6	73.72	13.22	1.48	1.72	0.66	0.65	4.52	2.90	0.36	0.10	0.34		trace	CO ₂ 0.15	99.82	
A3. III	1.229	.130	.009	.024	.017	.012	.073	.031			.004		—			
7	71.73	15.00	1.54	1.05	0.86	0.69	4.69	2.90	0.94	0.14	0.35		trace	CO ₂ 0.19 S trace	100.08	
A3. III	1.196	.147	.010	.015	.022	.013	.076	.031			.004					
8	69.64	13.04	4.15	1.98	0.32	0.54	5.46	3.55	0.69		0.55				99.92	
A3. III	1.161	.128	.026	.028	.008	.010	.088	.038			.007					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. LIPAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
292	I.(3)4.1''.'3.	Q 31.74 hy 1.39 or 33.92 mt 1.62 ab 23.06 il 0.61 an 2.78 C 2.96	Paney Bluff, South Australia.	W. S. Chapman.	R. L. Jack, G. S. So. Aust., B. 1, p. 15, 1912.	Porphyry.	
293	I.(3)4.1.3.	Q 34.74 hy 3.08 or 26.02 mt 1.39 ab 34.06 il 0.30 an 0.56 ap 0.34 C 0.81	Near Kumara, Taramaku River, New Zealand.	J. S. Maclaurin.	P. G. Morgan, N. Z. G. S., B. 13, p. 79, 1911.	Granite porphyry.	
294	I.(3)4.1.3.	Q 34.62 di 1.43 or 28.91 hy 2.74 ab 29.34 mt 1.86 an 0.83	Mayers Island, New Zealand.	A. G. Hall?	A. R. Sec. Min. Vict., (1907), 1908, p. 63.	Obsidian.	
295	I.''4.1(2).3(4).	Q 32.64 hy 0.76 or 23.91 mt 0.23 ab 36.15 an 3.89 C 1.94	Mount Albert, Waitahu, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Microgranite.	
296	I.''4.1.3(4).	Q 30.90 hy 1.43 or 25.58 mt 0.93 ab 38.25 ap 0.34 an 0.56 C 1.43	Mokihinui, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Aplite.	To be pub. in N. Z. G. S. B. 17.
297	I.(3)4.1''.'3.	Q 33.06 hy 1.56 or 33.36 mt 1.16 ab 23.58 il 0.30 an 2.50 ap 0.67 C 2.14	Mokihinui, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Granite.	To be pub. in N. Z. G. S. B. 17.
298	I.4.1''.'3(4).	Q 28.14 di 1.40 or 25.58 hy 1.79 ab 37.73 mt 1.39 an 3.06 il 0.46	Admiralty Island, South Pacific.	E. J. Dunn.	A. R. Sec. Min. Vict., (1911), 1912, p. 62.	Obsidian.	Spearhead.
299	I(II).4.1''.'3.	Q 25.26 ac 4.62 or 38.92 di 3.53 ab 25.15 wo 2.20	Bounty Island, South Pacific.	R. Morgan.	Speight and Finlayson, Subant. Islds. of N. Z., p. 739, 1909.	Granite.	

SUBRANG 4. DOSODIC. KALLERUDOSE. (C. I. P. W., 1902.)

1	I''4.1.(3)4.	Q 19.86 di 1.73 or 25.58 hy 0.90 ab 44.55 mt 5.10 an 2.22 hm 0.32	Rigaud Mountain, Quebec.	O. E. Le Roy.	O. E. Le Roy, B. G. S. A., XII, p. 389, 1901.	Quartz syenite porphyry.	
2	I.4(5).1.4.	Q 12.18 hy 0.70 or 23.35 mt 2.32 ab 55.54 hm 0.48 C 4.59	Methuen Township, Ontario.	N. N. Evans.	Adams and Barlow, Tr. R. Soc. Can., II (4), p. 54, 1909.	Syenite.	Also in Can. G. S. Mem. 6, p. 298, 1910.
3	I.''4.1.(3)4.	Q 31.68 hy 0.73 or 24.46 ap 0.67 ab 41.39 an 0.83 C 0.10	Arisaig, Nova Scotia.	W. H. Twen- hope.	W. H. Twenhope, A. J. S., XXVIII, p. 159, 1909.	Rhyolite.	
4	I.4.1(2).''4.	Q 25.02 di 3.84 or 21.13 mt 0.70 ab 40.35 il 0.76 an 3.61 C 3.67	Long Island, n. Portland, Maine.	W. C. Wheeler.	U. S. G. S. rec. lab.	Granite porphyry.	
5	I.(3)4.1(2).4(5).	Q 35.22 hy 0.66 or 8.90 il 0.15 ab 49.25 an 3.61 C 1.02	Fallon Hill, Enfield, Massachusetts.	G. Steiger.	B. K. Emerson, U. S. G. S. B. 228, p. 40, 1904.	Aplite.	
6	I.(3)4.1(2).4.	Q 33.18 hy 3.15 or 17.24 mt 2.09 ab 38.25 il 0.61 an 3.34 C 1.43	Neponset Valley, Massachusetts.	W. T. Hall.	F. Bascom, J. Ac. N. Sci. Phil., (2), XV, p. 148, 1912.	Rhyolite.	Center of dike.
7	I.''4.1(2).4.	Q 30.30 hy 2.33 or 17.24 mt 2.32 ab 39.82 il 0.61 an 3.61 C 2.75	Neponset Valley, Massachusetts.	W. T. Hall.	F. Bascom, J. Ac. N. Sci. Phil., (2), XV, p. 148, 1912.	Rhyolite.	Border of dike.
8	I''4.1.4.	Q 23.10 di 1.73 or 21.13 mt 4.87 ab 46.11 il 1.06 an 0.56 hm 0.76	West Lynn, Essex County, Massachusetts.	S. J. Schofield.	C. H. Clapp, pers. com.	Quartz keratophyre.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9	76.34	11.60	2.41	0.30	0.06	0.55	5.50	2.75	0.39	0.10	0.26	trace	trace	CO ₂ trace BaO 0.09 SrO none Li ₂ O none	100.35	
A1. I	1.272	.114	.015	.004	.002	.010	.089	.029			.003	—	—			
10	70.20	14.22	1.14	1.24	0.48	2.14	5.39	4.82	0.33		0.24	trace	trace	SO ₃ trace	100.20	2.63
A3. III	1.170	.139	.007	.017	.012	.038	.087	.051			.003	—	—			
11	74.80	15.46	1.04	n. d.	0.11	0.82	4.80	2.52	0.31						99.86	
A4. IV	1.247	.152	.007	(.014)	.003	.014	.077	.027								
12	72.80	15.50	2.04	0.60	0.08	0.52	5.70	2.52	0.27	0.16					100.19	
A3. III	1.213	.152	.013	.008	.002	.009	.092	.027								
13	72.56	12.33	0.80	0.82	trace	trace	5.36	3.08	4.59		0.20		trace		99.74	2.37
A3. III	1.209	.121	.005	.012	—	—	.087	.032			.003		—			
14	77.31	12.45	0.43	0.33	none	0.50	4.72	3.84	0.40	0.42	0.06	none	0.01	ZrO ₂ none F 0.15 S none BaO none	100.62	
A1. I	1.289	.122	.003	.005	—	.009	.076	.040			.001	—	—			
15	75.92	12.96	0.33	1.40	trace	0.15	4.60	4.15	0.32	0.16	0.05	trace	0.04	CO ₂ 0.03 F 0.12 BaO trace SrO none Li ₂ O trace	100.23	
A1. I	1.265	.127	.002	.019	—	.003	.074	.044			—	—	—			
16	66.90	14.86	0.93	3.41	0.31	1.23	5.56	5.02	0.31	0.16	0.43	0.12	0.15	F 1.00 BaO 0.14 SrO none Li ₂ O 0.06	100.59	
A1. I	1.115	.146	.006	.048	.008	.021	.090	.053			.005	.001	.002			
17	68.40	17.99	2.66	1.63	0.49	0.67	4.54	3.54	0.52				0.21		100.65	
A3. III	1.140	.176	.017	.022	.012	.012	.073	.037					.003			
18	74.93	13.11	0.51	0.77	0.23	0.30	5.64	4.28	0.28	0.04	0.07	trace	trace	CO ₂ none Cl trace	100.16	2.37
A2. II	1.249	.128	.003	.011	.006	.005	.091	.046			.001	—	—			
19	74.23	13.65	0.84	1.04	0.23	0.75	4.87	3.96	0.19		0.08	trace	trace	CO ₂ none Cl trace	99.84	2.56
A2. II	1.237	.134	.005	.014	.006	.013	.079	.042			.001	—	—			
20	74.19	12.85	1.60	0.98	0.11	0.12	5.86	3.98	0.10	0.16	0.09	trace	trace	CO ₂ none ZrO ₂ trace Cl trace BaO trace Li ₂ O trace	100.04	2.66
A2. II	1.237	.126	.010	.014	.003	.002	.105	.042			.001	—	—			
21	74.01	13.08	1.38	1.21	trace	0.13	5.78	4.31	0.16	0.10	0.11	trace	trace	CO ₂ none ZrO ₂ trace Cl trace Li ₂ O trace	100.27	2.38
A2. II	1.234	.128	.009	.017	—	.002	.094	.046			.001	—	—			
22	70.94	13.96	1.74	1.69	0.12	1.13	5.64	4.03	0.45	0.09	0.30	0.10	0.15	CO ₂ none ZrO ₂ 0.05 S none NiO none BaO 0.06 SrO trace	100.45	
A1. I	1.182	.137	.011	.024	.003	.020	.091	.043			.004	.001	.002			
23	75.40	13.56	0.21	0.61	0.07	0.38	4.64	4.40	0.94	0.44	0.04	0.09	trace		100.78	
A2. II	1.257	.133	.001	.008	.002	.007	.075	.047			—	—	—			
24	71.45	14.53	0.49	0.94	0.30	2.01	7.15	2.55	0.38	0.15	0.16	0.09	trace	CO ₂ 0.08 S trace BaO 0.03 SrO none	100.31	
A1. I	1.191	.142	.003	.013	.008	.036	.116	.028			.002	—	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 4. DOSODIC. KALLERUDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	I.(3)4.1.4.	Q 33.60 ac 1.85 or 16.12 di 0.43 ab 44.54 wo 0.93 mt 0.23 il 0.46 hm 1.60	Monterey, Franklin County, Pennsylvania.	H. N. Stokes.	F. Bascom, U. S. G. S. B. 150, p. 348, 1898.	Aporhyolite.	In W. T., p. 155.
10	I''4''1.(3)4.	Q 17.04 di 4.32 or 28.36 wo 2.09 ab 45.59 mt 1.62 an 0.28 il 0.46	Carlisle, Union County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S. B. 2, p. 199, 1908.	Granite.	
11	I.(3)4.1(2).4.	Q 34.68 hy 2.15 or 15.01 ab 40.35 an 3.87 C 3.47	Flat Shoals, Meriwether County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 77, 1902.	Granite.	
12	I.4.1''4.	Q 28.14 hy 0.20 or 15.01 mt 1.86 ab 48.21 hm 0.80 an 2.50 C 4.49	Endeavor, Fox River Valley, Wisconsin.	W. W. Daniells.	Hobbs and Leith, B. Un. Wisc. 158, p. 262, 1907.	Aporhyolite.	
13	I''4.1.4.	Q 29.46 hy 0.53 or 17.79 mt 1.16 ab 45.59 il 0.46 C 0.20	Checkerboard Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 125, 1896.	Rhyolite.	In W. T., p. 155.
14	I.(3)4.1.(3)4.	Q 34.98 hy 0.13 or 22.24 mt 0.70 ab 39.82 il 0.15 an 1.39 ft 0.81 C 0.10	St. Peters Dome, Colorado Springs quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. B. 419, p. 100, 1910.	Aplitic granite.	
15	I''4.1.(3)4.	Q 32.04 hy 2.24 or 24.46 mt 0.46 ab 38.78 an 0.83 C 0.61	Near Florissant, Pikes Peak Dis- trict, Colorado.	W. F. Hille- brand.	E. B. Mathews, U. S. G. S. B. 148, p. 160, 1897.	Granite.	In W. T., p. 155.
16	I(II).4(5).1.(3)4.	Q 11.34 di 3.62 or 29.47 hy 4.06 ab 47.16 mt 1.39 an 0.83 il 0.76 ap 0.34	Twin Creek Pikes Peak, Colorado.	W. F. Hille- brand.	E. B. Mathews, U. S. G. S. B. 148, p. 160, 1897.	Granite gneiss.	In W. T., p. 155.
17	I.4.1(2)''4.	Q 26.16 hy 2.26 or 20.57 mt 3.94 ab 8.25 an 3.34 C 5.41	San Mateo Moun- tain, Mount Taylor Region, New Mexico.	T. M. Chatard.	U. S. G. S. B. 148, p. 185, 1897.	Lava (rhyolite?).	In W. T., p. 155.
18	I.4.1.(3)4.	Q 26.52 ac 1.39 or 25.58 ns 0.73 ab 42.97 di 1.18 hy 1.32 il 0.15	Sitgreaves Peak, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 108, 1913.	Rhyolite.	
19	I.4.1(2).(3)4.	Q 28.26 hy 1.66 or 23.35 mt 1.16 ab 41.39 il 0.15 an 3.61	Marble Hill, San Francisco Moun- tains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 106, 1913.	Granite porphyry.	
20	I''4.1''4.	Q 25.50 ac 4.62 or 23.35 ns 1.34 ab 44.01 di 0.43 hy 0.10 il 0.15	Fremont Peak, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 113, 1913.	Riebeckite granite porphyry.	
21	I.4.1.(3)4.	Q 25.50 ac 4.16 or 25.58 ns 0.37 ab 42.97 wo 0.23 il 0.15	San Francisco Mountain, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 109, 1913.	Riebeckite rhyolite.	
22	I.4.1''4.	Q 20.76 di 2.88 or 23.91 wo 0.23 ab 47.68 mt 2.55 an 0.83 il 0.61 ap 0.30	Mount Sanford, Copper River Basin, Alaska.	G. Steiger.	U. S. G. S. B. 228, p. 271, 1904.	Augite andesite.	
23	I.4.1.(3)4.	Q 30.12 hy 1.12 or 25.02 mt 0.23 ab 40.35 an 1.95 C 0.41	Antelope Valley, John Day Basin, Oregon.	F. C. Calkins.	F. C. Calkins, Un. Cal. B. Dep. G., III, p. 156, 1902.	Rhyolite.	
24	I''4''1.4''.	Q 16.62 ac 0.92 or 15.67 di 4.21 ab 59.73 wo 2.02 mt 0.23 il 0.30	Near Big Bend, Rogue River, Port Orford quadrangle, Oregon.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Dacite porphyry.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
25	75.64	12.68	1.07	n. d.	trace	0.83	4.98	3.51	1.58						100.29	
A4. IV	1.261	.124	.007	(.014)	—	.014	.080	.037								
26	67.23	14.70	2.85	1.15	1.39	2.91	6.89	1.70	0.79		0.08	trace	0.12	CO ₂ ZrO ₂ Cl FeS ₂ BaO Cu Pb	trace none 0.02 0.02 none 0.04 none	99.89
A1. I	1.121	.144	.018	.017	.035	.051	.111	.018			.001	—	.002			
27	76.33	12.89	1.17	0.32	0.08	0.72	5.45	2.49	0.35			0.01			99.81	2.34
A3. III	1.272	.126	.008	.004	.002	.013	.088	.027				—				
28	73.61	13.01	2.66	0.51	0.53	1.34	6.69	2.02	0.04			trace			100.41	2.355
A3. III	1.227	.127	.017	.007	.013	.024	.108	.021				—				
29	72.70	13.79	1.01	n. d.	0.65	2.07	4.93	4.33	1.10						100.48	2.359
A4. IV	1.212	.135	.006	(.012)	.016	.038	.079	.046								
30	69.00	14.48	1.25	1.01	0.36	2.34	6.00	2.76	2.19			0.24			99.63	2.385
A3. III	1.150	.142	.008	.014	.009	.042	.097	.030				.002				
31	75.20	12.65	1.53	0.28	0.26	0.60	5.67	4.14	0.12		0.12		0.10		100.67	
A2. II	1.253	.124	.010	.005	.007	.011	.091	.044			.002		.001			
32	71.17	15.84	0.82	0.65	0.27	0.67	4.38	3.96	1.05	0.31	0.19	0.27	0.23	CO ₂ S BaO	0.52 0.04 0.04	100.41
A1. I	1.186	.155	.005	.009	.007	.013	.071	.042			.002	.002	.003			
33	70.74	17.00	1.61	0.98	trace	0.82	7.17	1.92	0.34		trace				100.58	
A3. III	1.179	.167	.010	.014	—	.014	.116	.020			—					
34	71.60	13.60	2.40	n.d.	0.21	2.30	5.55	3.53	0.70						99.89	
A4. IV	1.193	.133	.015	(.030)	.005	.041	.089	.037								
35	70.17	15.07	0.88	1.79	1.11	1.13	2.69	5.73	0.70	0.18	0.41	0.34	0.12	Cl F S Li ₂ O B ₂ O ₃	0.06 0.15 0.04 0.11 trace	100.68
A1. I	1.170	.148	.006	.025	.028	.020	.044	.061			.005	.002	.002			
36	71.40	13.40	0.93	4.16	0.10	0.44	6.20	2.23	0.90	0.13		0.14		SrO	0.01	100.04
A3. III	1.190	.131	.006	.058	.003	.008	.100	.023				.001				2.66
37	71.18	14.89	2.11	1.21	0.14	0.82	6.85	1.70	0.64	0.24	0.48				100.26	
A3. III	1.186	.146	.013	.017	.004	.014	.111	.018			.006					
38	76.10	11.39	n. d.	2.70	0.59	0.60	4.65	2.95	0.90		0.07				99.95	
A4. IV	1.235	.112	—	.038	.015	.011	.075	.032			.001					
39	71.65	13.90	2.64	0.24	0.09	0.10	6.65	4.22	n. d.						99.49	
A4. IV	1.194	.136	.016	.003	.002	.002	.107	.045								
40	71.65	13.04	2.79	1.80	trace	trace	6.30	3.98	1.10		trace		trace		100.66	
A3. III	1.194	.128	.018	.025	—	—	.102	.042			—		—			
41	71.30	13.53	2.33	1.75	0.70	0.67	5.77	3.02	0.56		0.51	0.03	0.07		100.24	
A2. II	1.188	.133	.014	.025	.018	.012	.094	.032			.006	—	.001			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. KALLERUDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
25	I."4.1."4.	Q 31.44 di 1.73 or 20.57 hy 0.92 ab 41.92 an 1.95	Cerro de los Navajos, n.Tulancingo, Mexico.	F. Baerwald.	C. A. Tenna, Z. D. G. G., XXXVII, p. 616, 1885.	Obsidian.	In W. T., p. 155.
26	I(II).4".1(2).4(5).	Q 14.70 di 7.78 or 10.01 mt 3.94 ab 58.16 il 0.15 an 4.17	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Br. Gui., p. 77, 1908.	Pyroxene granitite.	In W. T., p. 155.
27	I."4.1".4.	Q 33.36 di 0.43 or 15.01 mt 0.93 ab 46.11 hm 0.64 an 3.06	Encañada, Guamani Volcano, Ecuador.	E. Esch.	E. Esch, in W. Reiss, Ecuador, I, p. 71, 1901.	Obsidian.	
28	I".4.1.4".	Q 25.32 ac 0.92 or 11.68 di 2.81 ab 55.54 wo 1.14 mt 1.62 hm 1.28	Urcu-cui, Antisana Volcano, Ecuador.	F. von Wolff.	E. Esch, in W. Reiss, Ecuador, I, p. 81, 1901.	Liparite.	
29	I".4.1".(3)4.	Q 23.16 di 6.43 or 25.58 ab 41.40 an 2.78	Cerro del Quinche, Quito, Ecuador.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 444, 1887.	Obsidian.	In W. T., p. 155.
30	I".4.1(2).4.	Q 19.38 di 4.17 or 16.68 hy 0.58 ab 50.83 mt 1.86 an 4.17 ap 0.67	Inca-loma, Cotopaxi Volcano, Ecuador.	A. Young.	A. Young, Hochsch. Rep. Ec., II, (2), p. 256, 1902.	Biotite andesite.	
31	I".4.1.(3)4.	Q 26.76 ac 4.62 or 24.46 ns 0.12 ab 41.92 di 2.51 il 0.30	Cnoc an Droighinn, n. Inchnadampf, Sutherland, Scotland.	W. Pollard.	J. J. H. Teall, Mem. G. S. Un. K., N. W. Highlands, p. 449, 1907.	Aegirite felsite.	
32	I."4.1.(3)4.	Q 29.04 hy 1.36 or 23.35 mt 1.16 ab 37.20 il 0.30 an 1.67 ap 0.67 C 3.67	Inversnaid, Scotland.	W. Pollard.	G. S. Un. K., Sum. Prog., 1903, p. 57.	Orthoclase porphyry.	
33	I.4.1".4(5).	Q 19.86 hy 0.53 or 11.12 mt 2.32 ab 60.78 an 3.89 C 1.73	Ledmore, Assynt, Scotland.	A. Gemmell.	A. Gemmell, Tr. Edin. G. Soc., IX, (5), p. 418, 1910.	Aegirite aplite.	
34	I".4.1.4.	Q 21.30 di 8.27 or 20.57 ab 46.64 an 1.95	Carrock Fell, England.	G. Barrow.	A. Harker, Q. J. G. S., LI, p. 129, 1895.	Granophyre.	In W. T., p. 155.
35	I".4.1(2).4(3).	Q 28.20 hy 4.91 or 33.92 mt 1.39 ab 23.06 il 0.76 an 3.61 ap 0.67 C 3.06	Lamorna, Lands End, Cornwall.	W. Pollard.	Reid and Flett, Mem. G. S. Eng., Sh. 351, p. 59, 1907.	Granite.	
36	I".4.1.4.	Q 23.22 hy 7.16 or 12.79 mt 1.39 ab 52.40 ap 0.34 an 1.39 C 0.31	Y Trefan, Nant Ffrancon, Caernarvonshire, Wales.	H. W. Greenwood.	C. B. Travis, Pr. Liverp. G. Soc., X, (5), p. 315, 1909.	Rhyolite.	
37	I.4.1(2).4(5).	Q 22.80 hy 0.40 or 10.01 mt 2.55 ab 58.16 il 0.91 an 3.89 hm 0.32 C 0.31	Carn Llidi, St. Davids Head, Pembrokeshire, Wales.	J. V. Elsden.	J. V. Elsden, Q. J. G. S., LXIV, p. 283, 1908.	Aplite.	
38	I.(3)4.1.4.	Q 31.50 di 1.43 or 17.79 hy 5.66 ab 39.30 il 0.15 an 1.39	Bonne, Britany, France.	Pisani.	L. Vandernotte, Mass. Arm., p. 48, 1913.	Rhyolite.	
39	I".4.1."4.	Q 18.42 ac 7.39 or 25.02 di 0.46 ab 47.68 hy 0.36	Col de Salto, Corsica.	J. Deprat.	J. Deprat B. Ser. Ct. G. Fr., XVII, No. 114, p. 40, 1906.	Micropegmatite.	
40	I(II).4.1."4.	Q 20.34 ac 7.39 or 23.35 hy 3.01 ab 45.06 mt 0.46	Hougnatten, Sandsvar Parish, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 127, 1894.	Soda granite.	In W. T., p. 155.
41	I".4.1.4.	Q 23.34 di 1.11 or 17.79 hy 2.06 ab 49.25 mt 3.25 an 1.95 il 0.91	Kiruna, Lapland, Sweden.	Lundbohm.	O. Stutzer, N. J. B. B., XXIV, p. 570, 1907.	Keratophyre.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
42	70.08	13.83	2.97	1.04	1.10	0.83	5.33	3.84	0.47		0.40	0.02	0.02	S 0.04	99.97	
A2, II	1.168	1.36	.019	.014	.028	.014	.085	.040			.005	—	—			
43	67.81	14.92	1.42	0.80	1.71	2.83	6.45	3.01	0.30		0.78	0.02	0.06	CO ₂ S 0.28 0.07	100.47	
A2, II	1.130	.146	.009	.011	.043	.051	.104	.032			.010	—	.001			
44	73.63	12.89	n. d.	2.46	0.57	1.37	5.28	3.67	0.81						100.68	
A4, IV	1.227	.126	—	.034	.014	.025	.085	.039								
45	71.78	13.65	2.04	0.96	0.19	1.16	6.12	4.15	0.46						100.51	
A3, III	1.196	.134	.013	.014	.005	.021	.098	.044								
46	70.70	13.13	2.73	0.69	0.49	1.15	4.94	4.41	1.49		0.03		0.13		99.89	
A2, II	1.178	.129	.017	.010	.012	.021	.080	.046			—		.002			
47	67.39	16.24	1.14	2.29	1.05	4.33	4.50	1.24	0.77		0.47	0.14	0.07	S 0.01	99.64	2.72
A2, II	1.123	.159	.007	.032	.026	.077	.073	.013			.006	.001	.001			
48	72.11	15.85	1.63	n. d.	0.69	0.83	4.85	4.23	0.68						100.87	2.624
A4, IV	1.202	.155	.010	(.020)	.017	.014	.078	.045								
49	75.55	11.09	0.58	1.51	0.88	0.39	4.36	3.51	1.32	0.26	0.24				99.69	2.687
A3, III	1.259	.109	.004	.021	.022	.007	.070	.037			.003					
50	76.47	13.28	0.26	0.24	0.15	0.58	5.27	3.68	0.21	0.07	trace				100.21	2.68
A3, III	1.275	.130	.002	.003	.004	.010	.085	.039			—					
51	74.96	13.78	0.74	0.58	0.36	0.58	4.78	3.66	0.49	0.09	0.28				100.30	2.65
A3, III	1.249	.135	.005	.008	.009	.010	.077	.039			.004					
52	72.11	14.58	0.57	n. d.	0.29	2.63	6.64	2.23	0.69						99.74	2.66
A3, III	1.202	.143	.004	(.008)	.007	.046	.107	.023								
53	76.52	14.17	0.54	n. d.	0.20	0.61	4.24	3.66	0.92					B ₂ O ₃ trace	100.86	2.59
A3, III	1.275	.139	.003	(.003)	.005	.011	.068	.039								
54	72.93	13.34	n. d.	2.29	0.70	1.26	5.01	3.97	0.75		trace	trace	trace		100.25	2.63
A4, IV	1.216	.131	—	.032	.018	0.22	.081	.042			—	—	—			
55	65.27	13.50	4.40	2.52	0.55	0.85	5.19	4.21	1.98	0.14	1.09	0.17	0.27		100.14	
A2, II	1.088	.132	.028	.035	.014	.015	.084	.045			.014	.001	.003			
56	76.35	13.38	0.64	0.23	0.23	0.51	5.75	2.37	0.58						100.04	2.617
A3, III	1.272	.131	.004	.003	.006	.009	.093	.026								21°
57	68.54	15.47	2.03	2.09	0.21	0.30	5.68	5.75	0.59		0.14	0.10			100.90	2.622
A2, II	1.142	.152	.013	.029	.005	.005	.092	.062			.002	.001				

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. KALLERUDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
42	I''4.1''4.	Q 21.90 di 0.65 or 22.24 hy 2.50 ab 44.54 mt 2.09 an 3.06 il 0.78 hm 1.60	Tuolluvaara, Lapland, Sweden.	G. Nyblom.	P. Geijer, G. Kir. Dist., p. 208, 1910.	Quartz porphyry.	
43	I(II).4(5).1''4.	Q 12.60 di 8.86 or 17.79 hy 0.20 ab 54.49 mt 0.46 an 2.78 il 1.52 hm 1.12	Kirunavaara, Lapland, Sweden.	K. Schröder.	P. Geijer, G. Kir. Dist., p. 49, 1910.	Syenite porphyry.	
44	I''4.1.''4.	Q 24.08 di 5.48 or 21.68 hy 3.08 ab 44.54 an 0.56	Ornö, Sweden.	R. Mauzelius.	A. Cederström, G. F. F., XV, p. 111, 1893.	Granite.	In W. T., p. 155.
45	I.4.1.''4.	Q 19.50 ac 3.70 or 24.46 di 3.32 ab 47.16 wo 0.81 mt 1.16	Östra Solsjön, Balderånäs, Dalsland, Sweden.	D. Hummel.	P. J. Holmquist, B. Un. Ups., VII, p. 218, 1906.	Granite gneiss.	
46	I''4.1.(3)4.	Q 23.16 di 2.59 or 25.58 wo 0.70 ab 41.92 mt 2.78 an 0.83 hm 0.80	Ragunda, Jemtland, Sweden.	H. Santesson.	A. G. Högbom, Afh. Sv. G. Und., No. 182, p. 45, 1899.	Granite.	Not in W. T.
47	I''4.1.4''.	Q 24.90 hy 5.24 or 7.23 mt 1.62 ab 38.25 il 0.91 an 20.29 ap 0.34	Mans Ols, Sala, Sweden.	G. Nyblom.	H. J. Sjögren, G. F. F., XXXII, p. 1371, 1910.	Porphyrite.	
48	I.4.1(2).(3)4.	Q 23.94 hy 4.34 or 25.02 ab 40.87 an 3.81 C 1.84	Griesbach, Petersthal, Baden.	Thürach.	F. Schalch, Sp. Kte. Bad., Bl. Petersthal, No. 83, p. 31, 1895.	Granite.	In W. T., p. 155.
49	I.(3)4.1.(3)4.	Q 34.32 di 1.14 or 20.57 hy 3.48 ab 36.68 mt 0.93 an 0.56 il 0.46	Ardez, Löwer Engadine, Switzerland.	O. Züst.	O. Züst, In Diss. Zür., p. 18, 1905.	Granite.	
50	I''4.1.''4.	Q 30.60 di 0.89 or 21.68 hy 0.10 ab 44.54 mt 0.46 an 1.67	Piz Dado, Punteglia Gebiet, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Aplite.	
51	I''4.1''.''4.	Q 31.44 hy 0.90 or 21.68 mt 0.93 ab 40.35 il 0.61 an 2.78 hm 0.16 C 0.92	Piz Tumbif, Punteglia Gebiet, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Quartz porphyry.	
52	I.4.1''4''.	Q 20.88 di 3.50 or 12.79 wo 2.09 ab 56.07 an 3.61	Hohmad, Aarmassif, Switzerland.	O. Fischer.	O. Fischer, T. M. P. M., XXIV, p. 83, 1905.	Aplite.	
53	I.(3)4.1''.(3)4.	Q 36.00 hy 1.29 or 21.68 ab 35.63 an 3.06 C 2.14	Longone, Elba.	P. Aloisi.	P. Alcisi, Mem. Soc. Tosc. Sc. Nat., XXVI, p. 20, 1910.	Aplite.	
54	I''4.1.''4.	Q 23.88 di 3.32 or 23.35 hy 4.34 ab 42.44 an 2.22	Groppo del Ves- covo, n. Parma, Italy.	M. Ferrari.	M. Ferrari, Mem. Ac. Linc., (5), VIII, No. 21, p. 730, 1911.	Quartz porphyry.	
55	I(II).4.1.(3)4.	Q 17.10 di 1.94 or 25.02 hy 0.50 ab 44.01 mt 5.57 an 0.83 il 2.13 hm 0.64 ap 0.34	Costa Zichidi, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 688, 1913.	Trachyte (gibelite).	
56	I''4.1''4.	Q 32.04 hy 0.60 or 14.46 mt 0.70 ab 48.73 hm 0.16 an 2.50 C 0.31	Magnitnaya Gora, South Ural Moun- tains, Russia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XXIII, p. 118, 1904.	Quartz kera- tophyre.	
57	I''4(5).1.(3)4.	Q 12.06 ac 0.92 or 34.47 di 0.43 ab 47.16 hy 2.08 mt 3.02 il 0.30 ap 0.31	Ekone-Sungale Volcano, Kamerun.	A. Lindner.	A. Hintze, Jb. Pr. G. I.-A., XXVIII, p. 321, (1907), 1910.	Riebeckite granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
58	72.71	12.80	2.64	1.48	0.10	0.58	6.50	3.87	0.48				trace		101.16	
B3. IV	1.212	.125	.016	.021	.003	.010	.105	.041					—			
59	70.99	14.84	3.76	0.35	0.14	0.60	5.94	2.40	0.40				trace		99.42	
B3. IV	1.183	.145	.024	.005	.004	.011	.096	.025					—			
60	71.42	14.09	1.41	2.32	0.08	0.80	6.01	3.52	0.85						100.50	
A3. III	1.190	.138	.009	.032	.002	.014	.097	.037								
61	74.72	13.38	1.29	0.77	0.35	0.18	4.27	3.94	1.46				trace		100.36	
A3. III	1.245	.131	.008	.011	.009	.003	.069	.041					—			
62	73.44	14.35	0.50	n. d.	0.39	0.53	5.74	3.82	0.67			trace			99.44	
A3. III	1.224	.141	.003	(.006)	.010	.009	.093	.040				—				
63	72.02	14.44	1.32	1.04	0.41	0.98	6.10	4.26	0.35			trace	trace	SO ₃ trace	100.92	
A3. III	1.200	.142	.008	.014	.010	.018	.098	.045				—	—			
64	71.98	14.48	0.88	0.92	0.28	0.76	5.98	3.71	0.85			trace	trace		99.84	
A3. III	1.200	.142	.006	.013	.007	.014	.097	.039				—	—			
65	70.36	16.90	0.91	n. d.	trace	0.48	5.92	5.04	1.30						100.91	
A4. IV	1.173	.166	.006	(.012)	—	.009	.095	.053								
66	74.02	13.56	1.93	1.09	0.23	0.56	5.80	2.06	1.05				trace	Li ₂ O trace	100.30	
A3. III	1.234	.133	.012	.015	.006	.010	.094	.022								
67	73.50	15.35	0.76	n. d.	0.76	none	4.69	3.88	1.20						100.20	
A3. III	1.225	.150	.005	(.010)	.019	—	.076	.041								
68	73.10	13.12	2.65	0.52	0.32	0.87	5.24	2.33	0.47	0.32	0.46	0.35			99.75	
A2. II	1.218	.129	.017	.007	.008	.016	.084	.025			.006	.002				
69	70.47	14.49	3.40	0.33	0.16	0.52	5.32	4.00	0.39	0.07	0.35	0.13			99.63	
A2. II	1.175	.142	.021	.005	.004	.009	.085	.043			.004	.001				
70	68.28	17.08	1.58	1.03	0.14	0.26	5.68	4.62	0.12	0.41	0.23	0.10			100.13	
A2. II	1.138	.167	.010	.014	.004	.005	.092	.049			.003	.001				
71	72.68	15.59	0.45	0.06	trace	1.02	5.15	4.13	0.39						99.47	
B3. IV	1.211	.153	.003	.001	—	0.18	.083	.044								
72	72.60	12.63	1.50	1.68	0.11	0.86	5.16	4.21	0.58		0.07		trace	F 0.70	100.10	2.643
A2. II	1.210	.124	.009	.024	.003	.015	.084	.044			.001		—			
73	70.44	16.22	1.38	1.26	0.36	0.92	7.33	1.95	n. d.						99.68	
A3. III	1.174	.159	.009	.018	.009	.016	.118	.021								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 4. DOSODIC. KALLERUDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
58	I(II).4.1.''4.	Q 21.54 ac 7.39 or 22.80 ns 0.61 ab 44.02 di 2.45 an 3.01 hy 1.78 C 1.33	Green Mountain, Ascension Island, Atlantic Ocean.	C. Klement.	A. Renard, Challenger Repts., Petr. Oc. Isllds., p. 52, 1889.	Obsidian.	In W. T., p. 157.
59	I.4.1.''4.	Q 25.88 hy 0.40 or 13.90 mt 1.16 ab 50.30 hm 3.04 an 3.01 C 1.33	Weather Post Hill, Ascension Island, Atlantic Ocean.	C. Klement.	A. Renard, Challenger Repts., Petr. Oc. Isllds., p. 47, 1889.	Trachyte.	In W. T., p. 157.
60	I.4.1.4.⊙	Q 20.58 di 2.45 or 20.57 hy 1.95 ab 50.83 mt 2.09 an 1.11	Riding School, Ascension Island, Atlantic Ocean.	R. Reinisch.	R. Reinisch, D. Sudpol. Exp., II (7), p. 647, 1912.	Rhyolite obsidian.	
61	I.(3)4.1.(3)4.	Q 34.02 hy 1.30 or 22.80 mt 1.86 ab 36.15 an 0.83 C 1.84	Barachit, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 100, 1909.	Quartz bostonite.	
62	I.4.1.4.⊙	Q 23.58 di 0.22 or 22.24 hy 1.79 ab 48.73 an 2.22	Senafé, Adi Caieh, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 99, 1909.	Quartz bostonite.	
63	I.4.1.''4.	Q 18.54 ac 0.46 or 25.02 di 3.89 ab 50.83 wo 0.12 mt 1.62	Alid Volcano, Buia, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 120, 1909.	Dacite.	
64	I.4.1.4.⊙	Q 21.00 di 1.86 or 21.68 hy 0.70 ab 50.83 mt 1.39 an 1.67	Toguilé, Digsä, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 97, 1909.	Paisanite.	
65	I.4.''1.(3)4.	Q 15.30 hy 1.58 or 29.47 ab 49.78 an 2.50 C 0.92	Senafé, Adi Caieh, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 98, 1909.	Bostonite.	
66	I.(3)4.1.''4.	Q 30.54 hy 1.00 or 12.23 mt 2.78 ab 49.25 an 2.78 C 0.71	Dahamis, Hagher Mountains, Socotra Island, Red Sea.	E. Ludwig.	A. Pelikan, Ds. Ak. Wiss. Wien, LXXI, p. 78, 1902.	Dahamite (riebeck- ite groru- dite).	
67	I.''4.1.(3)4.	Q 29.64 hy 3.22 or 22.80 ab 39.82 C 3.37	Ampangarinana, Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 55, 1902.	Bostonite.	
68 ^a	I.(3)4.1.4.	Q 32.28 hy 0.80 or 13.90 mt 0.23 ab 44.01 il 0.91 an 2.50 hm 2.56 C 1.12 ap 0.67	Mount Betandroka, Sakalave Region, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 19, 1913.	Rhyolite.	
69	I.4.1.''4.	Q 23.46 hy 0.40 or 23.91 mt 0.23 ab 44.54 il 0.61 an 1.67 hm 3.20 C 0.52 ap 0.34	Mount Antsutrotro, Madagascar.	Boiteau.	A. Lacroix, pers. com.	Aegirite micro- granite.	
70	I.4.''1.(3)4.	Q 16.98 hy 0.53 or 27.24 mt 2.32 ab 48.21 il 0.46 an 0.56 ap 0.34 C 2.45	Marovitsika, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 176, 1913.	Aegirite trachyte.	
71	I.4.1(2).(3)4.	Q 24.78 mt 0.23 or 24.46 hm 0.32 ab 43.49 an 5.00 C 0.82	Angara River, Jenissei District, Siberia.	N. E. Podo- paev.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 199, 1910.	Granite.	Border of dike.
72	I.''4.1.(3)4.	Q 24.84 ac 1.85 or 24.46 di 3.56 ab 41.92 hy 0.76 mt 1.16 il 0.15	Rudikovka River, Jenissei District, Siberia.	A. Semen- chenko.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 218, 1910.	Soda granite.	F high.
73	I.4.''1(2).4(5).	Q 17.40 hy 2.09 or 11.68 mt 2.09 ab 61.83 an 4.45 C 0.41	Marekanka River, n. Ochotsk, Siberia.	Y. F. Gervé.	K. E. Bogdanowitch, Fund. Marek., p. 11, 1904?	Granite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
74	67.80	18.25	2.45	0.23	0.18	0.84	4.62	3.42	1.78				trace		99.57	2.62	
A3. III	1.130	.179	.015	.003	.005	.015	.074	.036					—				
75	74.78	11.94	2.46	0.88	0.16	0.07	4.77	3.99	0.28	0.19	0.17	trace	0.08	NiO BaO SrO Li ₂ O	0.03 none none none	99.80	2.70
A1. I	1.246	.117	.015	.013	.004	.001	.077	.042			.002	—	.001				
76	72.73	13.57	0.69	1.43	0.42	1.00	4.98	3.74	0.95	0.50	trace	0.07	0.04		100.12	2.43	
A2. II	1.212	.133	.004	.019	.011	.018	.081	.039			—	—	—				
77	72.02	12.60	0.32	3.29	0.55	1.95	4.84	2.82	0.20	0.30	0.69	0.11	0.04	CO ₂	none	99.73	2.61
A2. II	1.200	.123	.002	.046	.014	.035	.078	.030			.009	.001	—				
78	72.06	13.86	1.90	1.71	0.19	0.18	5.84	3.69	0.33	0.21	0.12	0.06	0.07	CO ₂ ZrO ₂ SO ₃ Cl Cr ₂ O ₃ V ₂ O ₅ NiO BaO SrO	0.03 none none trace trace none none none trace	100.25	2.625
A1. I	1.201	.136	.012	.024	.005	.003	.094	.039			.002	—	.001				
79	69.23	14.58	2.54	0.67	0.30	0.44	6.82	3.95	0.94		0.13		trace	NiO	0.05	99.65	
A2. II	1.154	.153	.016	.010	.008	.008	.110	.042			.002						
80	71.56	17.27	n. d.	0.78	trace	1.06	6.82	2.13	0.26			0.22		SO ₃	0.35	100.45	
A3. III	1.193	.169	—	.011	—	.019	.110	.022				.002					
81	66.68	14.63	2.18	2.31	0.30	1.88	6.12	4.02	0.83	0.38	0.20	0.28	0.49	CO ₂ ZrO ₂ SO ₃ Cl S Cr ₂ O ₃ V ₂ O ₅ BaO SrO	0.05 trace trace 0.03 0.05 none none none none	100.43	2.618
A1. I	1.111	.143	.014	.032	.008	.034	.099	.043			.003	.002	.007				
82	67.06	17.40	2.24	0.84	0.26	0.34	5.88	4.10	0.62	0.71	0.16	trace	trace	SO ₃ Cl	none trace	99.61	2.559
A2. II	1.118	.171	.014	.012	.007	.006	.095	.044			.002	—	—				
83	66.86	16.34	2.38	1.99	0.22	0.92	6.01	4.07	0.41	0.18	0.21	trace	trace	SO ₃ Cl Li ₂ O	none trace trace	99.59	2.646
A2. II	1.114	.160	.015	.028	.006	.016	.097	.044			.003						
84	76.19	13.49	0.55	0.38	0.06	0.59	4.71	3.79	0.66	0.13	0.06		none		100.61		
A2. II	1.270	.132	.003	.005	.002	.011	.076	.040			—						
85	69.01	14.21	2.23	2.89	0.62	2.11	6.30	2.07	0.09		0.58	0.12			100.23		
A2. II	1.150	.139	.014	.040	.016	.038	.102	.022			.007	.001					
86	73.25	12.60	0.34	2.65	0.51	trace	5.37	3.95	0.75		trace				99.42		
A3. III	1.221	.123	.002	.037	.013	—	.087	.042			—						

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. KALLERUDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
74	I.4.1(2)''4.	Q 23.10 hy 0.50 or 20.02 mt 0.70 ab 38.77 hm 1.92 an 4.17 C 5.51	Kekva River, n. Okhotsk, Siberia.	Y. F. Gervé.	K. E. Bogdanowitch, Fund. Marek., p. 57, 1904?	Dacite.	
75	I''4.1.(3)4.	Q 31.86 ac 0.92 or 23.35 di 0.22 ab 39.30 hy 0.30 mt 2.73 il 0.30 hm 0.16	Mount Coolum, Yandina, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 168, 1906.	Comendite.	
76	I.4.1(2)''4.	Q 26.10 di 1.18 or 21.68 hy 2.48 ab 42.44 mt 0.93 an 3.61	Glen Rock, Esk, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Rhyolite.	H. C. Richards, pers. com.
77	I(II).4.1(2).4.	Q 27.36 di 4.05 or 16.68 hy 3.94 ab 40.87 mt 0.46 an 4.17 il 1.37 ap 0.34	Ottaba, Esk, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Rhyolite.	H. C. Richards, pers. com.
78	I.4.1.4.⊙	Q 22.86 hy 1.95 or 21.68 mt 2.78 ab 49.25 il 0.30 an 0.83	The Young Man, Canobolas Moun- tains, New South Wales.	H. P. White.	Sussmilch and Jensen, Pr. Linn Soc. N. S. W., XXXIV, p. 191, 1909.	Trachytic rhyolite.	
79	I.4(5).1.4.	Q 13.50 di 1.51 or 23.35 hy 0.10 ab 57.64 mt 1.86 an 0.28 il 0.30 hm 1.28	Cadiangelong Creek, Canobolas Moun- tains, New South Wales.	H. I. Jensen.	Sussmilch and Jensen, Pr. Linn. Soc. N. S. W., XXXIV, p. 191, 1909.	Comendite.	
80	I.4.1''4''.	Q 21.96 hy 1.45 or 12.23 ap 0.67 ab 57.64 an 3.34 C 2.55	Broken Hill, New South Wales.	J. C. H. Min- gay.	J. B. Jaquet, Mem. G. S. N. S. W., No. 5, p. 51, 1894.	Granite.	Not in W. T.
81	I(II).4(5).1.4.	Q 12.03 di 6.28 or 23.91 hy 0.46 ab 51.87 mt 3.25 an 0.28 il 0.46 ap 0.68	Mount Jellore, Mittagong, New South Wales.	D. Mawson.	Taylor and Mawson, Pr. R. Soc. N. S. W., XXXVII, p. 341, 1903.	Trachyte.	
82	I.4''1.1''4.	Q 15.90 hy 0.70 or 24.46 mt 2.32 ab 49.78 il 0.30 an 1.67 hm 0.64 C 2.65	Hanging Rock, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 22, 1912.	Sölvsbergite.	
83	I.4(5).1(2)''4.	Q 13.20 hy 1.92 or 24.46 mt 3.43 ab 50.83 il 0.46 an 4.45 C 0.31	Brock's Monument, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 20, 1912.	Sölvsbergite.	
84	I.(3)4.1''(3)4.	Q 34.88 hy 0.46 or 22.24 mt 0.70 ab 39.82 an 3.06 C 0.51	Paku Islana, Tairua, New Zealand.	H. S. Washing- ton.	J. P. Iddings, pers. com.	Phonolitic rhyolite.	
85	I(II).4.1(2).4''.	Q 19.26 di 4.67 or 12.23 hy 1.76 ab 53.45 mt 3.25 an 4.17 il 1.03 ap 0.34	Deception Island, South Shetland Islands.	Boiteau.	E. Gourdon, pers. com.	Trachyte.	
86	I''4.1.1''4.	Q 25.26 ac 0.92 or 23.35 ns 0.46 ab 42.44 hy 6.18	Wandel Island, Graham Land, Antarctica.	Pisani.	E. Gourdon, Exp. Ant. Fr., Pet. vol., p. 200, 1908.	Microgranite (paisanite).	Also in C. R., CXLIV, p. 1226, 1907.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. LIPARASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	73.07	14.88	0.04	2.93	1.30	0.66	6.17	0.46	0.90		0.41			NIO none	100.82	
A3. III	1.218	.146	—	.040	.033	.012	.100	.005			.005					
2	72.33	12.99	none	2.50	0.97	1.73	7.60	none	1.09		0.74			CO ₂ 1.00	100.95	
A3. III	1.206	.127	—	.035	.024	.030	.123	—			.009					
3	75.46	13.18	0.91	n. d.	0.10	0.95	6.88	1.09	0.93						99.50	2.42
A3. III	1.258	.129	.006	(.012)	.003	.017	.111	.012								
4	72.51	13.10	2.81	0.90	0.20	1.84	6.76	0.33	0.35	0.04	0.31	0.06	0.20	CO ₂ 0.76 FeS ₂ none BaO none	100.17	
A1. I	1.209	.128	.018	.013	.005	.033	.109	.004			.004	—	.003			
5	71.26	11.87	0.10	2.12	1.08	2.88	6.73	0.05	2.71	0.62	0.28	0.10	0.06	F 0.01 FeS ₂ 0.26	100.13	
A2. II	1.188	.116	.001	.029	.027	.052	.108	.001			.004	.001	.001		(100.12)	
6	77.29	14.62	trace	—	0.38	trace	7.60	0.16	0.57						100.62	
A3. III	1.288	.143	—	—	.010	—	.122	.002								
7	72.50	17.00	1.17	n. d.	0.74	0.20	6.28	0.77	1.62						100.28	
A4. IV	1.208	.167	.007	(.014)	.019	.004	.102	.008								
8	71.20	17.60	1.74	n. d.	1.17	0.76	6.20	0.85	1.37						100.89	
A4. IV	1.187	.172	.011	(.022)	.029	.014	.100	.009								
9	73.10	13.20	0.26	3.60	0.92	0.59	6.30	0.35	1.10		0.92				100.34	
A3. III	1.218	.129	.002	.050	.023	.011	.102	.004			.012					
10	67.10	15.55	1.53	3.92	1.34	0.30	5.65	0.85	2.90		0.55				99.69	
A3. III	1.118	.152	.010	.054	.034	.005	.091	.009			.008					
11	75.06	13.65	1.78	0.02	0.19	0.74	7.65	0.16	0.70				trace		99.95	2.52
A3. III	1.251	.134	.011	—	.005	.013	.124	.002								
12	78.77	12.44	0.95	n. d.	0.02	0.53	6.79	0.24	0.26	0.14					100.14	2.614
A3. III	1.313	.122	.006	(.012)	.001	.010	.110	.003								
13	77.66	12.30	0.61	0.17	0.73	0.16	6.96	0.19	0.46	0.33		trace			99.57	2.634
A3. III	1.294	.121	.004	.003	.018	.003	.112	.002								
14	75.06	14.21	1.31	0.27	0.09	0.42	6.88	0.58	0.62	0.56	none	0.03	0.04	SO ₃ 0.11 V ₂ O ₅ none Li ₂ O none	100.18	2.604
A2. II	1.251	.139	.008	.004	.002	.007	.111	.006			—	—	—			

RANG 2. DOMALKALIC. TOSCANASE. (C. I. P. W., 1902.)

1	69.65	14.68	3.01	1.01	0.32	1.02	0.22	9.25	0.74		0.44		0.04		100.38	
A2. II	1.161	.144	.019	.014	.008	.018	.003	.099			.005		—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 5. PERSODIC. NOYANGOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I''4.1(2).5.	Q 29.76 hy 7.92 or 2.78 il 0.76 ab 52.40 an 3.34 C 2.96	University Mine, Cobalt, Ontario.	R. E. Hore.	R. E. Hore, J. G., XVIII, p. 275, 1910.	Aplitic soda granite.	
2	I(II).4.1.5.	Q 23.22 di 0.71 ab 64.45 hy 5.47 an 1.11 il 1.37 ec 2.30	University Mine, Cobalt, Ontario.	N. L. Bowen.	N. L. Bowen, J. Can. Min. Inst., XII, p. 523, (1909), 1910.	Aplitic soda granite.	Fresh?
3	I.4.1.(4).5.	Q 28.92 di 2.67 or 6.67 hy 0.50 ab 58.16 an 1.67	Berkeley, California.	C. Palache.	C. Palache, B. Dep. G. Cal. Un., I, p. 67, 1894.	Soda rhyolite.	In W. T., p. 157.
4	I''4.1(2).5.	Q 29.76 hy 0.50 or 2.22 mt 2.78 ab 57.11 il 0.61 an 4.17 hm 0.96	Rudhanah-Airde, Argyllshire, Scotland.	E. G. Radley.	J. S. Flett, Mem. G. S. Scot., G. Knapd., p. 94, 1911.	Porphyry.	
5	I(II).4.1.5.	Q 25.56 di 9.71 or 0.56 hy 1.16 ab 56.59 mt 0.23 an 1.95 il 0.61 ap 0.34	Kettlestown, Linthgow, Scotland.	G. S. Blake.	J. D. Falconer, Tr. R. Soc. Edin., XLV, p. 147, 1908.	Felsite?	
6	I''4.1.5.	Q 32.04 hy 1.00 or 1.11 ab 63.93 C 1.94	Near Rathdrum, County Wicklow, Ireland.	F. H. Hatch.	F. H. Hatch, Geol. Mag., (3), VI, p. 70, 1889.	Quartz kerato- phyre.	In W. T., p. 157.
7	I''4.1.''5.	Q 30.42 hy 3.75 or 4.45 ab 53.45 an 1.11 C 5.41	Prat-meur, Brittany, France.	Not stated.	C. Barrois, VIII Cong. G. Int., Guide Exc., VII, p. 21, 1900.	Euritic aplite.	In W. T., p. 157.
8	I.4.1(2).''5.	Q 27.24 hy 5.80 or 5.00 ab 52.40 an 3.89 C 5.00	Rostellec, Brittany, France.	Not stated.	C. Barrois, VIII Cong. G. Int., Guide Exc., VII, p. 21, 1900.	Euritic aplite.	In W. T., p. 157.
9	I(II).(3)4.1(2).5.	Q 30.06 hy 7.05 or 2.22 mt 0.46 ab 53.45 il 1.82 an 3.06 C 1.22	Begon, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 66, 1913.	Albitophyre.	
10	I(II).''4.1.''5.	Q 26.28 hy 8.15 or 5.00 mt 2.32 ab 47.68 il 1.22 an 1.39 C 4.79	Deux Evailles, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 41, 1913.	Microgranite.	
11	I.4.1.5.⊙	Q 28.14 di 1.08 or 1.11 hm 1.78 ab 64.97 an 2.22	Uli River, n. Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 17, 1904?	Dacite.	
12	I.(3)4.1.5.	Q 36.18 di 0.25 or 1.67 hy 1.55 ab 57.64 an 2.50	Noyang, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XX, p. 46, 1884.	Quartz porphyrite.	In W. T., p. 157.
13	I.(3)4.1.5.	Q 35.16 hv 1.80 or 1.11 mt 0.70 ab 58.99 hm 0.16 an 0.83 C 0.41	Noyang, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XX, p. 41, 1884.	Quartz porphyrite.	In W. T., p. 157.
14	I''4.1.5.	Q 31.98 hy 0.20 or 3.34 mt 0.93 ab 58.16 hm 0.61 an 1.95 C 1.53	Raymond Terrace, New South Wales.	W. A. Grieg.	G. W. Card, pers. com.	Rhyolite.	

SUBBRANG 1. PERPOTASSIC.

1	I''4.(I)2.1.	Q 30.30 hy 0.80 or 55.04 mt 2.09 ab 1.57 il 0.76 an 5.00 hm 1.60 C 2.45	Pidjastjälko, Jukkasjärvi, Lapland, Sweden.	H. Santesson.	F. Svenonius, Sv. G. Und., No. 183, p. 15, 1900.	Porphyry.	
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CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	72.26	13.58	2.97	0.75	0.03	1.24	2.18	5.69	0.57	0.09					99.36	
B3. IV	1.204	.133	.019	.010	.001	.022	.035	.061								
2	70.90	14.59	0.39	n. d.	0.45	1.40	1.84	6.11	2.23	0.73				FeS ₂ 2.03	100.67	2.546
B3. IV	1.182	.143	.002	(.004)	.011	.025	.030	.065								
3	73.17	13.34	1.35	0.76	0.81	1.32	1.80	7.10	0.54			0.07		BaO 0.10	100.36	
A2. II	1.220	.131	.008	.011	.020	.023	.029	.076				—				
4	64.83	16.68	3.74	1.22	0.79	2.85	0.86	7.56	0.92					ZrO ₂ 0.35 BaO 0.11	99.91	
A2. II	1.081	.164	.023	.017	.020	.051	.014	.081								
5	66.20	14.33	2.09	1.93	0.89	1.39	2.58	7.31	0.83	0.48	0.65	0.25	0.13	CO ₂ 0.36 ZrO ₂ 0.02 SO ₃ none Cl trace FeS ₂ 0.12 BaO 0.18 SrO trace	99.74	
A1. I	1.103	.140	.013	.026	.044	.025	.042	.078			.008	.002	.002			
6	66.32	15.06	4.59	0.53	0.86	1.63	1.32	6.82	1.28		trace	0.18	trace	ZrO ₂ none S 0.05 Cr ₂ O ₃ none Sb 0.14 PbO 0.09 CuO 0.03 ZnO 0.27 CoO 0.15 BeO none	99.32	
A1. I	1.105	.148	.029	.007	.022	.029	.021	.072			—	.001	—			
7	73.97	12.66	1.35	1.00	0.55	1.08	2.38	6.21	0.79		0.15	0.05	0.08		100.27	
A2. II	1.233	.124	.009	.014	.014	.020	.039	.066			.002	—	.001			
8	73.92	12.78	0.86	1.54	0.45	1.05	2.27	6.39	0.75		0.16	0.08	0.11		100.36	
A2. II	1.232	.125	.005	.021	.011	.019	.037	.068			.002	—	.002			
9	72.71	12.98	1.27	1.48	0.77	1.44	2.25	6.10	0.84		0.22	0.08	0.14		100.28	
A2. II	1.212	.127	.008	.021	.019	.026	.036	.065			.003	—	.002			
10	72.46	12.80	2.02	0.73	0.59	1.37	2.52	6.27	0.44		0.65		0.44		100.29	
A2. II	1.208	.125	.013	.010	.015	.025	.040	.067			.008		.006			
11	72.27	14.63	3.17	n. d.	0.45	1.33	1.97	5.67	0.40		0.31		0.52		100.72	
A4. IV	1.205	.143	.020	(.040)	.011	.023	.032	.061			.004		.007			
12	72.24	13.52	1.40	1.04	0.49	1.28	1.81	6.40	0.81		0.23	0.15	0.17	BaO 0.09	99.63	
A2. II	1.202	.132	.009	.014	.012	.023	.029	.068			.003	.001	.002			
13	68.55	16.46	0.85	0.56	0.17	4.17	1.92	5.59	n. d.		0.35		0.52	F 1.80	101.03 .80	
A2. II	1.143	.161	.005	.008	.004	.075	.031	.060			.004		.008		100.23	
14	68.36	13.24	1.29	3.39	1.15	2.51	2.05	5.34	2.63				0.27		100.23	
A3. III	1.139	.130	.008	.048	.029	.045	.033	.057					.004			
15	65.98	15.00	2.35	1.47	0.79	1.58	2.91	7.47	0.88		0.54	0.20	0.14	CO ₂ 0.50 S 0.03 BaO 0.15	99.99	
A2. II	1.100	.147	.015	.020	.020	.029	.047	.080			.007	.001	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 2. DOPOTASSIC. DELLENOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I."4."2.2(3).	Q 34.98 hy 0.10 or 33.92 mt 2.32 ab 18.34 hm 1.44 an 6.12 C 1.53	Westerly, Rhode Island.	I. A. Williams.	I. A. Williams, A. G., XXXV, p. 37, 1905.	Granite.	
2	I.(3)4.2.2".	Q 32.82 hy 2.03 or 36.14 pr 2.03 ab 15.72 an 6.95 C 2.35	Homestake Mine, Lead, South Dakota.	W. J. Sharwood.	W. J. Sharwood, Ec. Geol., VI, p. 734, 1911.	Rhyolite.	
3	I."4.2.2.	Q 31.26 hy 2.40 or 42.26 mt 1.86 ab 15.20 an 6.39 C 0.31	Antelope Hills, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 338, p. 58, 1908.	Trachyte.	
4	I".4.2(3).(1)2.	Q 23.16 hy 2.00 or 45.04 mt 3.94 ab 7.34 hm 0.91 an 14.18 C 1.84 Z 0.55	Antelope Range, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 338, p. 58, 1908.	Trachyte.	
5	I(II).4.(1)2.2(3).	Q 17.52 hy 5.32 or 43.37 mt 3.02 ab 21.48 il 1.22 an 5.56 ap 0.67	Ajax Mine, Cripple Creek, Colorado.	W. F. Hillebrand.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 45, 1906.	Granite.	
6	I".4.2.2.	Q 28.38 hy 2.20 or 40.03 mt 1.62 ab 11.00 hm 3.52 an 7.23 ap 0.34 C 2.96	Cerro Mercado, Durango, Mexico.	H. W. Nichols.	O. C. Farrington, Field Col. Mus., G. Ser., II, p. 224, 1904.	Rhyolite.	
7	I."4.(1)2.2(3).	Q 32.82 hy 1.93 or 36.70 mt 2.09 ab 20.44 il 0.30 an 5.28	Edeby, Stockholm, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
8	I."4."2.2(3).	Q 32.22 hy 3.21 or 37.81 mt 1.16 ab 19.39 il 0.30 an 5.28 C 0.10	Svalnäs, Rydboholm, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
9	I."4.2.2(3).	Q 31.38 hy 3.48 or 36.14 mt 1.86 ab 18.86 il 0.46 an 7.23	Alby, Rydboholm, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
10	I."4.(1)2.2(3).	Q 30.48 di 1.51 or 37.25 hy 0.80 ab 20.96 mt 1.86 an 5.00 il 1.22 hm 0.80	Gambed, Fjällbacka, Bohuslän, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
11	I".(3)4.2.2".	Q 32.82 hy 6.78 or 33.92 il 0.61 ab 16.77 an 6.39 C 2.75	Solhem, Fjällbacka, Bohuslän, Sweden.	C. G. L. Broomé.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	Same rock as No. 3, I. 3, 2.2.
12	I.(3)4."2.2.	Q 33.84 hy 1.73 or 37.51 mt 2.09 ab 15.20 il 0.46 an 5.56 ap 0.34 C 1.53	Vasastaden, Stockholm, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
13	I".(3)4.2.2".	Q 32.16 hy 1.32 or 33.36 mt 1.16 ab 16.24 il 0.61 an 6.95 ft 3.90 C 4.69	Storholm, Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 51, 1899.	Quartz porphyry.	F high. In W. T., p. 157.
14	I(II).4.2.2(3).	Q 26.46 di 1.18 or 31.69 hy 8.11 ab 17.29 mt 1.86 an 11.12	Dellen, Helsing- land, Sweden.	H. Santesson.	F. Svenonius, G. F. F., X, p. 273, 1888.	Hypersthene andesite.	Dellenite of Brögger, Eg. Kg., II, p. 59, 1895. In W. T., p. 157.
15	I".4".(1)2.2(3).	Q 16.32 di 1.30 or 44.48 hy 1.40 ab 24.63 mt 3.48 an 5.56 il 1.06	Vänstern, Lake Vattern, Smaland, Sweden.	R. Mauzelius.	A. Gavelin, Sver. G. Und., Arab. 5, No. 3, p. 22, 1912.	Quartz orthophyre.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16	69.21	15.59	1.08	1.29	0.11	1.30	8.92	0.75							99.94	
A3. III	1.154	.152	.007	.019	.003	.023	.094									
17	69.19	14.12	1.64	1.71	1.58	1.66	1.81	8.45							100.31	
A3. III	1.153	.138	.010	.024	.040	.030	.029	.090								
18	66.64	15.10	0.69	3.08	1.36	1.49	2.05	6.71	2.82						99.94	
A3. III	1.111	.148	.004	.043	.034	.027	.033	.071								
19	65.17	17.09	1.26	2.93	1.75	1.39	2.16	5.70	2.75						100.20	
A3. III	1.086	.168	.008	.040	.044	.025	.035	.061								
20	66.24	15.64	1.16	2.19	0.89	2.17	2.05	6.60	3.25						100.19	2.455
A3. III	1.102	.153	.008	.030	.022	.039	.033	.070								
21	60.77	21.27	2.94	0.57	0.41	2.88	1.16	7.97	2.13						100.10	2.714
A3. III	1.013	.209	.018	.008	.010	.052	.019	.085								
22	69.90	14.09	0.88	2.33	0.98	1.10	2.35	5.99	1.00	0.10	0.40	0.19	0.02	CO ₂ 0.40 ZrO ₂ none Cl 0.03 F none S 0.02 Cr ₂ O ₃ none NiO none BaO 0.02 SrO trace CuO 0.01	99.81	2.649
A1. I	1.165	.138	.006	.032	.025	.020	.038	.064			.005	.001	—			

RANG 2. DOMALKALIC. TOSCANASE.

1	67.27	13.67	1.83	2.49	1.72	1.90	2.79	5.80	0.45	0.08	1.70	0.16	0.19		100.05	
A2. II	1.121	.134	.011	.035	.043	.034	.045	.062			.021	.001	.003			
2	71.85	15.25	1.04	2.56	0.63	2.46	3.18	3.04	0.17		0.58	trace	trace		100.76	
A3. III	1.198	.150	.006	.036	.016	.044	.052	.032			.007	—	—			
3	70.44	14.69	1.45	1.17	0.74	1.43	3.66	4.61	1.14		0.32				99.65	
A3. III	1.174	.142	.009	.017	.019	.025	.059	.049			.004					
4	71.69	14.84	n. d.	1.25	0.37	1.03	3.13	7.09	0.49	0.10			trace		99.99	
A4. IV	1.195	.145	—	.018	.009	.018	.050	.075					—			
5	74.54	13.30	0.92	0.79	0.01	1.26	3.69	5.01	n. d.				0.51	S 0.04	100.07	
A2. II	1.242	.130	.006	.011	—	.022	.060	.053					.007			
6	73.01	13.73	0.44	1.48	0.01	0.94	3.50	5.62	0.18	0.05			0.09		99.05	2.624
B3. IV	1.217	.135	.003	.021	—	.017	.056	.060					.001			
7	65.02	17.93	4.69	0.17	1.24	1.34	3.04	5.98	0.86				0.11		100.38	
A3. III	1.084	.176	.029	.002	.031	.023	.049	.064					.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 2. DOPOTASSIC. DELLENOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	I.4."2.2.	Q 22.12 hy 1.88 or 52.26 mt 1.62 ab 14.15 an 6.39 C 0.82	Wirvik, Finland.	B. Frosterus.	B. Frosterus, T. M. P. M., XIII, p. 188, 1892.	Granite.	In W. T., p. 157.
17	I".4.(1)2.2.	Q 20.16 di 2.48 or 50.04 hy 4.65 ab 15.20 mt 2.32 an 5.28	Triberg Waterfall, Baden.	C. Habenstreit.	F. Schalch, Erl. G. Kt. Bad., No. 101-102, p. 11, 1897.	Granite.	Not in W. T.
18	I(II).4.2.2".	Q 21.60 hy 8.55 or 39.48 mt 0.93 ab 17.29 an 7.51 C 1.73	Der Gabel, Münsterthal, Schwarzwald, Baden.	Bunsen's lab- oratory.	A. Schmidt, Ref. N. J., 1889, I, p. 95.	Porphyry.	In W. T., p. 159.
19	I(II).4.2.2(3).	Q 23.04 hy 8.62 or 33.92 mt 1.86 ab 18.44 an 6.95 C 4.79	Brandenberg, Münsterthal, Schwarzwald, Baden.	Bunsen's lab- oratory.	A. Schmidt, Ref. N. J., 1889, I, p. 95.	Porphyry.	In W. T., p. 159.
20	I".4.2.2".	Q 21.72 hy 5.10 or 39.82 mt 1.86 ab 17.29 an 10.84 C 1.12	Monte Cucco, Cerveteri, Italy.	H. S. Washing- ton.	H. S. Washington, J. G., V, p. 49, 1897.	Toscanite.	In W. T., p. 159.
21	I.4.2".2.	Q 16.50 hy 1.00 or 47.26 mt 1.88 ab 9.96 hm 1.60 an 14.46 C 5.41	Kija River, Jenissei District, Siberia.	Not stated.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 254, 1910.	Granite.	
22	I".4.(1)2.2(3).	Q 28.38 hy 5.27 or 35.58 mt 1.39 ab 19.91 il 0.76 an 4.73 ap 0.34 C 1.94	Cobar, New South Wales.	W. A. Greig.	A. R. Dep. Min. N. S. W. (1911), 1912, p. 198.	Orthoclase porphyry.	

SUBRANG 3. SODIPOTASSIC. TOSCANOSE. (C. I. P. W., 1902.)

1	I".4.2."3.	Q 22.32 di 0.89 or 34.47 hy 4.66 ab 23.58 mt 2.55 an 7.51 il 3.19 ap 0.34	Ujarartorsuak, Nagsuaks Penin- sula, Greenland.	W. C. Phalen.	W. C. Phalen, Smiths. Misc. Coll., XLV, p. 208, 1904.	Quartz monzonite.	
2	I".(3)4.2".3(4).	Q 34.02 hy 4.64 or 17.79 mt 1.39 ab 27.25 il 1.06 an 12.23 C 2.24	Havnefjord, Jones Sound, Ellesmere Land.	P. Schei.	C. Bugge, Rep. 2d Arct. Exp. Fram, No. 22, p. 18, 1910.	Hypersthene adamellite.	
3	I.4.2.3.⊙	Q 27.18 hy 2.43 or 27.24 mt 2.09 ab 30.92 il 0.61 an 6.95 C 0.92	Pim Island, Rice Strait, Ellesmere Land.	P. Schei.	C. Bugge, Rep. 2d Arct. Exp. Fram, No. 22, p. 18, 1910.	Granite aplite.	
4	I.4.(1)2.(2)3.	Q 22.92 hy 3.28 or 41.70 ab 26.20 an 5.00 C 0.20	Taggart Bay, Lake Keepawa, Quebec.	F. G. Wait.	G. C. Hoffman, A. R. G. S. Can., IX, p. 18R, (1896), 1898.	Granitite gneiss.	In W. T., p. 159.
5	I".4.(1)2.3.	Q 30.78 di 1.24 or 29.47 hy 0.92 ab 31.44 mt 1.39 an 4.73	Highdale Quarry, n. Rockland, Knox County, Maine.	Student of J. F. Kemp.	T. N. Dale, U. S. G. S. B. 313, p. 122, 1907.	Granite.	
6	I.4.(1)2.3.	Q 28.08 hy 2.51 or 33.36 mt 0.70 ab 29.34 an 4.73 C 0.20	Mount Kearsarge, New Hampshire.	J. H. Perry.	J. H. Perry, J. G., XI, p. 405, 1903.	Granite.	
7	I".4."2.3.	Q 19.74 hy 3.10 or 35.58 mt 0.91 ab 25.68 hm 4.00 an 6.39 C 4.08	Pemigewasset, New Hampshire.	L. G. Eakins.	U. S. G. S. B. 148, p. 67, 1897.	Quartz porphyry.	In W. T., p. 159.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
8	69.89	15.08	1.04	1.46	0.66	2.07	4.73	4.29	0.23	0.31		trace			99.76	
A3. III	1.165	.148	.007	.020	.017	.038	.076	.046				—				
9	64.62	16.46	1.82	2.14	1.10	2.39	4.57	5.21	0.39	0.13	0.81	0.21	0.12	CO ₂ 0.11 ZrO ₂ 0.03 Cl 0.05 FeS ₂ 0.19 BaO 0.03 SrO trace CuO trace	100.38	2.666
A1. I	1.077	.161	0.11	.030	.028	.043	.074	.055			.010	.001	.002			
10	74.15	13.35	1.26	0.53	0.23	1.92	2.84	4.58	0.50	0.13	0.12	0.06		CO ₂ none	99.67	
A2. II	1.236	.131	.008	.007	.006	.034	.046	.049			.002	—				
11	74.06	14.45	0.15	1.44	trace	1.03	4.74	4.36	0.52					S 0.02	100.77	
A3. III	1.234	.142	.001	.020	—	.018	.076	.047								
12	72.45	13.32	1.93	0.63	.044	1.81	3.55	3.86	1.51	0.59	0.27	0.06		CO ₂ none	100.42	
A2. II	1.208	.130	.012	.009	.011	.082	.057	.041			.003	—				
13	71.63	13.71	2.09	1.76	0.19	1.31	3.24	4.49	0.51	0.08	0.34	trace	trace	CO ₂ 0.41 S trace	99.76	
A2. II	1.194	.134	.013	.025	.005	.023	.052	.048			.004	—	—			
14	68.88	14.96	0.64	4.64	0.37	1.74	3.83	4.97	0.24	0.06	trace		trace		100.33	2.696
A3. III	1.148	.146	.004	.064	.009	.031	.062	.053			—		—			12°
15	68.36	16.58	0.90	3.24	0.45	1.85	3.97	5.27	0.17	0.18	trace		trace		100.97	
B3. IV	1.139	.163	.006	.045	.011	.033	.064	.056					—			
16	66.60	15.05	1.07	4.42	0.36	2.21	4.03	5.42	0.41		0.26		trace	BaO none	100.33	2.612
A2. II	1.110	.148	.007	.061	.009	.039	.065	.058			.009		—			17°
17	67.12	14.97	2.61	2.19	0.54	1.69	3.92	5.15	1.13	0.19	0.37	0.14	0.02	ZrO ₂ 0.03 S none Cr ₂ O ₃ trace BaO 0.19	100.26	
A1. I	1.119	.147	.016	.031	.014	.030	.063	.055			.009	.001	—			
18	71.23	13.64	1.70	1.00	0.75	2.31	3.55	3.79	1.72		0.21		0.05		99.95	2.690
A2. II	1.187	.134	.011	.015	.019	.041	.057	.040			.003		—			
19	72.47	14.78	0.57	2.00	0.34	1.27	4.03	4.53	0.48			trace		CO ₂ trace	100.47	
A3. III	1.208	.145	.004	.028	.009	.023	.065	.048				—				
20	71.24	14.34	0.80	1.80	0.66	2.17	4.25	4.14	0.03	0.05	0.40		0.02	CO ₂ none ZrO ₂ trace FeS ₂ 0.18 BaO none Li ₂ O none	100.08	
A1. I	1.187	.141	.005	.025	.017	.039	.069	.044			.005		—			
21	68.40	15.75	2.97	0.65	0.12	1.64	4.16	5.78	0.48				trace	S 0.63	100.58	2.66
A3. III	1.140	.154	.019	.009	.003	.029	.067	.062					—			
22	71.45	13.83	1.10	1.91	0.56	1.44	2.62	6.09	0.32		0.42	0.03	0.17	ZrO ₂ 0.02 Cl 0.03 P 0.01 S 0.02 BaO 0.02	100.04	
A1. I	1.191	.136	.007	.026	.014	.026	.042	.065			.008	—	.002			
23	66.72	16.15	1.23	2.19	0.73	2.30	4.36	5.66	0.77				0.07		100.18	
A3. III	1.112	.158	.008	.031	.018	.041	.070	.061					.001			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
8	I.4.2.3(4).	Q 20.34 di 2.75 or 25.58 hy 2.05 ab 39.82 mt 1.62 an 7.23	Millstone Hill, Barre, Vermont.	G. I. Finlay.	G. I. Finlay, G. S. Vt. Rep., III, p. 55, 1902.	Granite.	
9	I''4(5).2.3.	Q 11.70 di 1.36 or 30.58 hy 3.46 ab 38.77 mt 2.55 an 8.90 il 1.52 ap 0.51	Little Ascutney Mountain, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 47, 1903.	Windsorite (diorite).	In W. T., p. 159.
10	I.(3)4.2.3.	Q 35.52 hy 0.60 or 27.24 mt 1.16 ab 24.10 il 0.30 an 9.45 hm 0.48 C 0.20	Erving, Massachusetts.	G. Steiger.	B. K. Emerson, U. S. G. S. B. 228, p. 39, 1904.	Granite (gneissoid).	
11	I.4.(1)2.3(4).	Q 26.46 hy 2.51 or 26.13 mt 0.23 ab 39.82 an 5.00	Hingham, Plym- outh County, Massachusetts.	F. J. Moore.	T. N. Dale, U. S. G. S. B. 470, p. 276, 1911.	Granite.	
12	I.(3)4.2.3''.	Q 32.70 hy 1.10 or 22.80 mt 1.39 ab 29.87 il 0.46 an 8.90 hm 0.96	Pelham, Massachusetts.	G. Steiger.	T. N. Dale, U. S. G. S. B. 470, p. 261, 1911.	Granite (gneissoid).	
13	I''4.''2.3.	Q 32.10 hy 1.56 or 26.69 mt 3.02 ab 27.25 il 0.61 an 6.39 C 1.12	Stony Brook, Neponset Valley, Massachusetts.	W. T. Hall.	F. Bascom, J. Ac. N. Sci. Phila., (2), XV, p. 135, 1912.	Rhyolitic granite.	
14	I''4.2.3.	Q 19.62 hy 8.82 or 29.47 mt 0.83 ab 32.49 an 8.62	Squam Light, Cape Ann, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VII, p. 109, 1899.	Quartz syenite porphyry.	In W. T., p. 159.
15	I''4.2.3.	Q 18.18 hy 6.25 or 31.13 mt 1.39 ab 33.54 an 9.17 C 1.02	Wolf Hill, Gloucester, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VI, p. 800, 1898.	Nordmarkite.	In W. T., p. 159.
16	I(II).4''2.3.	Q 15.24 di 3.41 or 32.25 hy 1.06 ab 34.06 mt 1.62 an 6.95 il 1.37	Prospect Street, Gloucester, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VI, p. 798, 1898.	Akerite.	In W. T., p. 159
17	I''4.''2.3.	Q 19.98 hy 2.72 or 30.58 mt 3.71 ab 33.01 il 0.76 an 7.51 ap 0.34 C 0.20	Hoosac Mountain, Massachusetts.	E. T. Allen.	J. E. Wolff, U. S. G. S. B. 228, p. 41, 1904.	Granite gneiss.	
18	I.''4.2.3''.	Q 30.42 di 0.86 or 22.24 hy 1.63 ab 23.88 mt 2.55 an 10.29 il 0.46	Conanicut Island, Rhode Island.	L. V. Pirsson.	L. V. Pirsson, A. J. S., XLVI, p. 373, 1893.	Granite.	In W. T., p. 159
19	I.4.''2.3''.	Q 27.06 hy 4.07 or 26.69 mt 0.93 ab 34.06 an 6.39 C 0.92	Branford, n. New Haven, Connecticut.	F. Ward.	F. Ward, A. J. S., XXVIII, p. 137, 1909.	Granite.	
20	I''4.2.3''.	Q 24.60 di 2.54 or 24.46 hy 2.42 ab 36.15 mt 1.16 an 7.78 il 0.76	Griswold, Connecticut.	W. A. Drushell.	G. F. Loughlin, U. S. G. S. B. 492, p. 123, 1912.	Granite.	
21	I.4.''2.3.	Q 18.54 di 0.65 or 34.47 wo 0.12 ab 35.12 mt 2.09 an 6.95 hm 1.60	Millstone Point, Connecticut.	H. T. Vulté.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	In W. T., p. 159.
22	I.4.2.3(4).	Q 28.02 hy 3.51 or 36.14 mt 1.62 ab 22.01 il 0.76 an 7.23 C 0.31	Northville, Fulton County, New York.	E. W. Morley.	W. J. Miller, N. Y. St. Mus. B. 153, p. 19, 1911.	Granite porphyry.	
23	I''4(5)''2.3.	Q 12.90 di 3.29 or 33.92 hy 3.44 ab 36.68 mt 1.86 an 7.51	Little Falls, Herkimer County, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R. LIV, p. R69, (1900), 1902.	Augite syenite.	Iron oxides corrected in N. Y. St. Mus. A. R. LX, (2), p. 514, 1907.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
24	75.15	14.65	0.11	0.90	0.04	0.92	3.60	4.71	0.24		0.12	0.02	0.01	ZrO ₂ 0.01 SO ₃ 0.12 BaO 0.05	100.64	
A1. I	1.253	.144	.001	.013	.001	.016	.058	.050			.002	—	—			
25	75.02	13.73	0.83	0.99	0.03	0.88	3.36	4.74	0.17		0.10	0.04	0.04	CO ₂ 0.11 ZrO ₂ 0.05 SO ₃ 0.08 BaO 0.06	100.23	
A1. I	1.250	.135	.005	.014	.001	.016	.054	.050			.001	—	—			
26	72.57	15.11	0.59	1.02	0.30	1.65	3.92	4.33	0.47						99.96	
A3. III	1.210	.148	.004	.014	.008	.030	.063	.046								
27	71.79	15.00	0.77	1.12	0.51	2.50	3.09	4.75	0.64						100.17	
A3. III	1.197	.147	.005	.015	.013	.045	.050	.051								
28	70.45	15.98	0.75	1.84	0.77	2.60	3.83	3.59	0.45					Li ₂ O trace	100.26	
A3. III	1.174	.157	.005	.026	.019	.047	.061	.038								
29	72.27	14.30	1.16	0.97	0.70	1.56	3.46	5.00	0.25	0.04	0.31	0.02	trace	CO ₂ 0.21	100.25	
A2. II	1.205	.140	.007	.014	.018	.028	.056	.053			.004	—	—			
30	71.51	13.82	1.76	1.20	0.80	1.79	3.64	4.63	0.31	0.17	0.33	0.30	0.03	CO ₂ trace	100.29	
A2. II	1.192	.136	.011	.017	.020	.032	.059	.049			.004	.002	—			
31	71.19	14.01	1.66	1.29	0.44	2.04	3.56	4.45	0.33	0.04	0.35	0.34	0.02	CO ₂ trace	99.72	
A2. II	1.187	.137	.010	.018	.011	.037	.057	.047			.004	.002	—			
32	70.83	12.70	2.67	1.36	0.53	1.88	3.49	4.83	0.34	0.07	0.41	0.33	0.03	CO ₂ trace	99.47	
A2. II	1.181	.125	.017	.019	.013	.034	.056	.051			.005	.002	—			
33	69.48	13.95	2.82	1.70	1.10	2.81	3.65	3.45	0.50	0.04	0.47	0.49	0.03	CO ₂ trace	100.49	
A2. II	1.158	.137	.018	.024	.028	.050	.059	.037			.006	.003	—			
34	69.44	15.46	1.31	1.43	1.01	2.11	3.97	4.25	0.29	0.07	0.48	0.22	0.03	CO ₂ trace	100.07	
A2. II	1.157	.152	.008	.020	.025	.038	.065	.045			.006	.002	—			
35	69.56	15.52	1.67	1.19	0.41	1.20	4.46	4.68	0.67	0.34	0.31	0.08	0.07	CO ₂ none S trace BaO 0.10 SrO trace Li ₂ O trace	100.26	
A1. I	1.159	.152	.010	.017	.010	.021	.072	.050			.004	—	.001			
36	66.46	14.92	1.87	3.08	1.11	3.10	2.63	4.74	0.80	0.06	0.83	0.29	0.07	CO ₂ trace S trace	99.96	
A2. II	1.108	.146	.012	.043	.028	.055	.042	.050			.010	.002	.001			
37	73.10	13.82	0.93	1.43	0.51	1.72	3.04	5.06	0.23		0.24	trace	trace	SO ₂ trace	100.08	2.64
A3. III	1.218	.130	.006	.019	.013	.031	.049	.054			.003	—	—			
38	72.19	14.06	0.70	1.80	0.84	1.88	3.46	3.94	0.18		0.48	trace	0.16	SO ₂ trace	99.69	2.68
A2. II	1.203	.138	.004	.025	.021	.034	.056	.041			.006	—	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
24	I.(3)4.(1)2.3.	Q 33.72 hy 1.42 or 27.80 mt 0.23 ab 30.39 il 0.30 an 4.45 C 2.04	Near Waterloo, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1908), p. 73, 1909.	Granite gneiss.	
25	I.(3)4.(1)2.3.	Q 35.10 hy 1.16 or 27.80 mt 1.16 ab 28.30 il 0.15 an 4.45 C 1.53	Waterloo, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1908), p. 72, 1909.	Granite gneiss.	
26	I.4.2.3''.	Q 28.68 hy 2.12 or 25.58 mt 0.93 ab 33.01 an 8.34 C 0.92	Guilford, Howard County, Maryland.	W. F. Hille- brand.	G. H. Williams, U. S. G. S. A. R. 15, p. 672, 1895.	Granite.	In W. T., p. 159.
27	I.4.''2.3.	Q 28.68 hy 2.62 or 28.36 mt 1.16 ab 25.20 an 12.51	Woodstock, Baltimore County, Maryland.	W. F. Hille- brand.	G. H. Williams, U. S. G. S. A. R. 15, p. 672, 1895.	Granite.	Also E. B. Mathews, Md. G. S. A. R. II, p. 156, 1898, In W. T., p. 159.
28	I.4.2''3(4).	Q 28.76 hy 4.67 or 21.13 mt 1.16 ab 31.96 an 13.07 C 1.12	Dorsey Run Cut, Howard County, Maryland.	W. F. Hille- brand.	C. R. Keyes, U. S. G. S. A. R. 15, p. 697, 1895.	Granite.	In W. T., p. 159.
29	I.4.2.3.⊙	Q 28.44 hy 2.20 or 29.47 mt 1.62 ab 29.34 il 0.61 an 7.78 C 0.31	Richmond, Virginia.	W. M. Thorn- ton.	T. L. Watson, Va. G. S. B. 1A, p. 81, 1909.	Granite.	
30	I.4.2.3.⊙	Q 28.44 hy 2.26 or 27.24 mt 2.55 ab 30.92 il 0.61 an 6.67 ap 0.67	Petersburg, Virginia.	W. M. Thorn- ton.	T. L. Watson, Va. G. S. B. 1A, p. 81, 1909.	Granite.	
31	I.''4.2.3.	Q 29.28 hy 1.63 or 26.13 mt 2.32 ab 29.87 il 0.61 an 8.34 ap 0.67 C 0.31	Henrico County, n. Richmond, Virginia.	W. M. Thorn- ton.	T. L. Watson, Va. G. S. B. 1A, p. 81, 1909.	Granite.	
32	I''4.(1)2.3.	Q 28.86 di 1.94 or 28.36 hy 0.40 ab 29.34 mt 3.25 an 5.00 il 0.76 hm 0.48 ap 0.67	Near Richmond, Virginia.	W. M. Thorn- ton.	T. L. Watson, Va. G. S. B. 1A, p. 81, 1909.	Granite.	
33	I''4.2.3(4).	Q 28.32 hy 2.80 or 20.57 mt 4.18 ab 30.92 il 0.91 an 11.40 ap 1.01	Fredericksburg, Virginia.	W. M. Thorn- ton.	T. L. Watson, Va. G. S. B. 1A, p. 81, 1909.	Granite.	
34	I''4.2.3''.	Q 24.24 hy 3.29 or 25.02 mt 1.86 ab 34.06 il 0.91 an 8.62 ap 0.67 C 1.12	Near Richmond, Virginia.	W. M. Thorn- ton.	T. L. Watson, Va. G. S. B. 1A, p. 81, 1909.	Granite.	
35	I.4.''2.3''.	Q 22.25 hy 1.53 or 27.80 mt 2.32 ab 37.73 il 0.61 an 5.84 C 0.92	Monterey Moun- tain, Virginia.	W. F. Hille- brand.	Darton and Keith, A. J. S., VI, p. 307, 1898.	Felsophyre.	In W. T., p. 161.
36	I(II)4.2''3.	Q 24.60 hy 5.70 or 27.80 mt 2.78 ab 22.01 il 1.52 an 13.34 ap 0.67 C 0.61	Lovingsston, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. 3A, p. 63, 1913.	Quartz monzonite gneiss.	
37	I.''4.2.3.	Q 30.90 hy 2.62 or 30.02 mt 1.39 ab 25.68 il 0.46 an 8.62 C 0.20	Near Batesburg, Lexington County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 193, 1908.	Granite gneiss.	
38	I.''4.2.3''.	Q 30.90 hy 4.34 or 22.80 mt 0.93 ab 29.34 il 0.91 an 9.45 C 0.71	Near Columbia, Lexington County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 206, 1908.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
39	70.77	14.89	0.75	1.24	0.43	2.08	4.47	4.70	0.19		0.36	trace	trace	SO ₃ trace	99.88	2.65
A3. III	1.180	.146	.005	.017	.011	.038	.073	.050			.005	—	—			
40	70.54	14.56	1.06	1.62	0.78	1.28	3.97	5.37	0.27		0.60	trace	trace	SO ₃ 0.06	100.11	
A3. III	1.176	.143	.007	.022	.020	.023	.065	.057			.008	—	—			
41	70.11	15.76	1.07	1.76	0.62	1.84	3.39	4.27	0.45		0.45	trace	trace	SO ₃ trace	99.72	2.66
A3. III	1.169	.155	.007	.024	.016	.033	.055	.045			.006	—	—			
42	69.52	16.77	0.95	1.56	0.75	1.82	3.43	4.10	1.43		0.36	trace	trace	SO ₃ trace	99.69	2.65
A3. III	1.159	.165	.006	.022	.019	.032	.055	.043			.005	—	—			
43	68.80	15.73	2.14	1.57	1.16	1.64	3.45	4.54	0.33		0.45	trace	trace	SO ₃ trace	99.81	2.65
A3. III	1.147	.154	.013	.022	.019	.029	.056	.048			.006	—	—			
44	68.71	15.41	1.85	1.59	1.25	1.64	3.48	4.61	0.34		0.60	trace	trace	SO ₃ trace	99.46	2.65
A3. III	1.145	.151	.012	.022	.031	.029	.056	.049			.008	—	—			
45	68.70	15.49	1.10	3.73	0.86	1.70	3.09	3.36	0.81		0.84	trace	trace	SO ₃ 0.13	99.91	2.73
A3. III	1.145	.152	.007	.051	.022	.030	.050	.036			.011	—	—		(99.51)	
46	68.15	14.30	2.44	2.49	1.04	2.80	3.80	3.84	0.28		0.60	trace	0.11	SO ₃ trace	99.85	2.66
A2. II	1.136	.140	.015	.035	.026	.050	.061	.040			.008	—	.002			
47	65.72	17.22	1.70	2.67	1.45	2.80	3.68	3.80	0.35		0.72	trace	trace	SO ₃ 0.08	100.19	2.68
A3. III	1.095	.169	.011	.036	.036	.050	.060	.040			.009	—	—			
48	76.37	13.31	1.21	n. d.	0.10	1.13	4.02	3.68	0.20						100.02	2.642
A4. IV	1.273	.130	.008	(.016)	.003	.020	.065	.039								
49	75.45	13.71	0.92	n. d.	0.18	0.94	3.87	4.30	0.40						99.77	
A4. IV	1.258	.134	.006	(.012)	.005	.017	.063	.045								
50	72.96	14.70	1.28	n. d.	0.07	1.28	4.18	4.73	0.23						99.43	
A4. IV	1.216	.144	.008	(.016)	.002	.023	.068	.050								
51	71.66	16.05	0.86	n. d.	0.17	1.07	4.66	4.92	1.00						100.39	
A4. IV	1.194	.157	.005	(.010)	.004	.019	.075	.052								
52	71.00	16.33	1.12	n. d.	0.35	1.83	4.80	4.65	0.87						100.95	
A4. IV	1.183	.160	.007	(.014)	.009	.033	.077	.050								
53	70.90	15.86	1.37	n. d.	0.02	2.15	5.05	4.62	0.50						100.47	2.664
A4. IV	1.182	.155	.008	(.016)	.001	.038	.081	.049								
54	70.88	15.86	1.77	n. d.	0.93	1.79	3.94	4.64	0.49						100.30	2.659
A4. IV	1.181	.155	.011	(.022)	.023	.032	.064	.049								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODI POTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
39	I.4.2.3(4).	Q 21.78 di 3.43 or 27.80 hy 0.33 ab 38.25 mt 1.16 an 6.39 il 0.76	Filbert Station, York County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 207, 1908.	Granite.	
40	I.4.(1)2.3.	Q 22.38 di 0.43 or 31.69 hy 2.72 ab 34.06 mt 1.62 an 5.84 il 1.22	Greenwood, Greenwood County, South Carolina.	T. L. Watson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 187, 1908.	Granite.	Also T. L. Wat- son, J. G., XVII, p. 735, 1909.
41	I."4.2.3.	Q 28.46 hy 3.05 or 25.02 mt 1.62 ab 28.82 il 0.91 an 9.17 C 2.24	Heath Springs, Lancaster County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 222, 1908.	Granite.	
42	I."4.2.3.	Q 28.62 hy 3.35 or 23.91 mt 1.39 ab 23.82 il 0.76 an 8.90 C 3.57	Brown Quarry, Newberry County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 195, 1908.	Granite.	
43	I.4.2.3.⊙	Q 26.58 hy 2.30 or 26.69 mt 3.02 ab 29.34 il 0.91 an 8.06 C 2.14	High Point, Laurens County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 190, 1908.	Granite.	Also in T. L. Watson, J. G., XVII, p. 735, 1909.
44	I"4.2.3.	Q 25.44 hy 3.36 or 27.24 mt 2.78 ab 29.34 il 1.22 an 8.06 C 1.73	Flat Rock, Kershaw County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 223, 1908.	Granite.	
45	I"(3)4.2.3".	Q 30.84 hy 6.56 or 20.02 mt 1.62 ab 26.20 il 1.67 an 8.34 C 3.67	Batesburg, Saluda County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 192, 1908.	Granite porphyry.	Also in T. L. Watson, J. G., XVII, p. 735, 1909.
46	I(II)4.2.3(4).	Q 24.06 di 2.51 or 22.24 hy 3.22 ab 31.96 mt 3.48 an 10.84 il 1.22	Beverly, Pickens County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 181, 1908.	Granite gneiss.	
47	I(II)4.2".3(4).	Q 20.58 hy 5.71 or 22.24 mt 2.55 ab 31.44 il 1.37 an 13.90 C 1.94	Table Rock, Saluda River, Pickens County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S., (IV), B. 2, p. 185, 1908.	Granite gneiss.	
48	I.(3)4."2.3(4).	Q 35.40 hy 2.41 or 21.48 ab 34.06 an 5.56 C 0.61	Odessadale, Meriwether County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 79, 1902.	Granite.	
49	I.(3)4.(1)2.3".	Q 33.54 hy 2.08 or 25.02 ab 33.01 an 4.73 C 0.92	Conyers, Rockdale County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 127, 1902.	Granite gneiss.	
50	I.4."2.3.	Q 26.76 hy 2.31 or 27.80 ab 35.63 an 6.39 C 0.31	Lithonia, DeKalb County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 213, 1901.	Granite gneiss.	Also in Ga. G. S. B. 9A, p. 127, 1902.
51	I.4.(1)2.3".	Q 22.80 hy 1.72 or 28.91 ab 39.30 an 5.28 C 1.12	Stone Mountain, Georgia.	R. L. Packard.	T. L. Watson, Ga. G. S. B. 9A, p. 117, 1902.	Granite.	
52	I.4.2.3(4).	Q 19.02 hy 2.75 or 27.80 ab 40.35 an 9.17	Goss, Elbert County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 210, 1902.	Granite.	
53	I.4."2.3(4).	Q 19.32 di 3.19 or 27.24 hy 0.53 ab 42.44 an 6.95	Sparta, Hancock County, Georgia.	T. L. Watson.	T. L. Watson, J. G., IX, p. 119, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 178, 1902.
54	I.4.2.3.⊙	Q 23.64 hy 5.20 or 27.24 ab 33.54 an 8.90 C 1.02	Line Creek, Fayette County, Georgia.	T. L. Watson.	T. L. Watson, J. G., IX, p. 119, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 103, 1902

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
55	70.30	16.17	1.19	n. d.	0.31	2.61	4.72	4.88	0.63						100.81	2.666
A4. IV	1.172	.158	.008	(.016)	.008	.046	.076	.052								
56	70.24	16.78	1.46	n. d.	0.76	2.00	3.70	5.03	0.50						100.47	
A4. IV	1.171	1.64	.009	(.018)	.019	.036	.060	.053								
57	70.18	17.30	1.20	n. d.	0.64	2.03	4.36	4.77	0.35						100.83	
A4. IV	1.170	.170	.008	(.016)	.016	.036	.070	.051								
58	69.88	16.42	1.96	n. d.	0.36	1.78	4.45	5.63	0.39						100.87	2.662
A4. IV	1.165	.161	.013	(.026)	.009	.032	.072	.060								
59	69.77	17.05	1.60	n. d.	0.99	2.21	3.97	4.08	0.44						100.11	2.674
A4. IV	1.163	.167	.010	(.020)	.025	.039	.065	.043								
60	69.74	16.72	1.45	n. d.	0.36	1.93	4.84	5.33	0.47						100.84	2.84
A4. IV	1.162	.164	.009	(.018)	.009	.034	.078	.056								27°
61	69.64	17.21	1.32	n. d.	0.66	2.14	4.53	4.95	0.31						100.80	
A4. IV	1.161	.169	.008	(.016)	.016	.073	.073	.053								
62	69.53	16.46	1.15	n. d.	0.85	2.10	5.00	4.91	0.91						100.91	
A4. IV	1.159	.161	.007	(.014)	.021	.038	.081	.052								
63	69.51	16.32	2.38	n. d.	1.28	1.84	3.82	3.47	1.11						99.73	
A4. IV	1.159	.160	.015	(.030)	.032	.033	.061	.037								
64	69.48	16.64	1.84	n. d.	0.29	2.32	4.74	4.49	0.46						100.26	
A4. IV	1.158	.163	.011	(.022)	.007	.041	.076	.047								
65	69.37	16.99	1.99	n. d.	0.84	2.03	3.44	4.54	0.55						99.75	
A4. IV	1.156	.167	.013	(.026)	.021	.036	.055	.048								
66	69.34	17.01	1.74	n. d.	0.61	2.77	4.69	4.54	0.26						100.96	2.701
A4. IV	1.156	.167	.011	(.022)	.015	.050	.076	.048								
67	69.13	17.14	1.52	n. d.	0.79	1.85	4.06	5.49	0.52						100.50	
A4. IV	1.152	.168	.009	(.018)	.020	.033	.066	.059								
68	69.07	16.56	1.37	n. d.	0.76	1.83	4.65	5.02	0.92						100.18	
A4. IV	1.151	.162	.009	(.018)	.019	.032	.075	.053								
69	69.00	17.31	1.31	n. d.	0.42	1.18	4.00	4.74	1.79						99.75	
A4. IV	1.150	.170	.008	(.016)	.011	.021	.065	.050								
70	68.79	16.48	0.98	n. d.	1.30	1.76	4.74	5.85	0.38						100.28	2.657
A4. IV	1.147	.162	.006	(.012)	.033	.031	.076	.063								27°
71	67.98	14.84	1.00	3.15	0.91	2.17	2.66	4.76	0.49	0.14	0.84	0.34	trace	CO ₂ none Cl trace F trace S 0.08 BaO 0.20 SrO trace Li ₂ O trace Graph. 0.21	99.77	
A1. I	1.133	.146	.006	.044	.023	.039	.043	.051			.010	.002	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOPASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
55	1.4''2.3''.	Q 18.24 di 3.81 or 28.91 hy 0.96 ab 39.82 an 8.34	Hutchins, Oglethorpe County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 203, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 191, 1902.
56	1.4.2.3.⊙	Q 23.04 hy 4.31 or 29.47 ab 31.44 an 10.01 C 1.53	Flat Rock, Pike County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 216, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 98, 1902.
57	1.4.2.3''.	Q 20.40 hy 3.71 or 28.36 ab 36.68 an 10.01 C 1.33	Carlton, Madison County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 203, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 200, 1902.
58	1.4''2.3.	Q 16.62 di 0.71 or 33.36 hy 3.97 ab 37.73 an 8.06	Greenville, Meriwether - County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 216, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 75, 1902.
59	1.4.2.3(4).	Q 23.52 hy 5.14 or 23.91 ab 34.06 an 10.84 C 2.04	Appling, Columbia County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 216, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 236, 1902.
60	1.4''2.3''.	Q 16.02 di 0.92 or 31.14 hy 2.81 ab 40.87 an 8.34	Oglesby, Elbert County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 203, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 217, 1902.
61	1.4''2.3''.	Q 17.82 hy 3.71 or 29.47 ab 38.25 an 10.56 C 0.51	Oglesby, Elbert County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 203, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 216, 1902.
62	1.4''2.3(4).	Q 15.60 di 2.29 or 28.91 hy 2.82 ab 42.44 an 7.78	Hutchins, Oglethorpe County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 203, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 191, 1902.
63	1''4.2.3(4).	Q 27.48 hy 5.18 or 20.57 ab 31.96 an 9.17 C 2.96	Athens, Clarke County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 164, 1902.	Granite gneiss.	
64	1.4.2.3(4).	Q 18.54 hy 3.60 or 26.13 ab 39.82 an 11.40	Sparta Quarry, Hancock County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 179, 1902.	Granite.	Also in J. G., IX, p. 119, 1901.
65	1.4.2.3.⊙	Q 25.14 hy 5.53 or 26.19 ab 28.82 an 10.01 C 2.86	Milledgeville, Baldwin County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 216, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 171, 1902.
66	1.4''2.3(4).	Q 16.92 di 1.64 or 26.69 hy 3.58 ab 39.82 an 11.95	Eatonton, Putnam County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 168, 1902.	Granite.	
67	1.4.2.3.⊙	Q 17.88 hy 4.38 or 32.80 ab 34.58 an 9.17 C 1.02	Near Greensboro, Greene County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 186, 1902.	Granite.	Also in A. G., XXVII, p. 216, 1901.
68	1.4''2.3''.	Q 16.92 hy 4.28 or 29.47 ab 39.30 an 8.90 C 0.20	Griffin, Spalding County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 205, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 100, 1902.
69	1.4.(1)2.3.	Q 23.46 hy 3.21 or 27.80 ab 34.06 an 5.84 C 3.47	Elberton, Elbert County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 205, 1902.	Granite.	
70	1.4(5).(1)2.3.	Q 12.84 di 1.79 or 35.03 hy 4.02 ab 39.82 an 6.39	Lexington, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 196, 1902.	Granite.	Also in A. G., XXVII, p. 205, 1901.
71	1''4.2.3.	Q 27.24 hy 6.00 or 28.36 mt 1.39 ab 22.53 il 1.52 an 8.90 ap 0.67 C 2.04	Rowland, Bartow County, Georgia.	H. N. Stokes.	A. H. Brooks, U. S. G. S. B. 168, p. 55, 1900.	Granite.	In W. T., p. 161.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
72	69.69	15.64	0.90	1.62	0.66	1.22	3.34	5.30	n. d.		0.29				98.66	
A3. III	1.162	.153	.006	.022	.017	.021	.054	.057			.004					
73	73.30	15.32	1.21	0.96	0.39	1.33	3.47	3.86	0.21	0.05					100.10	
A3. III	1.222	.150	.008	.013	.010	.023	.056	.041								
74	69.94	15.19	1.88	0.60	0.92	1.15	3.95	4.29	0.85	0.14	0.25	0.13	0.03	NiO trace	99.32	
B2. III	1.166	.149	.012	.008	.023	.021	.064	.046			.003	.001	—			
75	74.61	13.36	0.83	0.36	0.35	1.35	2.49	5.70	0.42	0.19	0.11	0.06	trace	CO ₂ none S trace Cr ₂ O ₃ none NiO none BaO 0.10 SrO trace	99.93	
A1. I	1.244	.131	.005	.005	.009	.024	.040	.061			.001	—	—			
76	74.37	13.12	0.73	0.87	0.35	1.26	2.57	6.09	0.25	0.05	0.29	0.06	trace	BaO 0.10 SrO trace Li ₂ O trace	100.11	
A2. II	1.240	.128	.005	.011	.009	.022	.042	.065			.004	—	—			
77	72.07	15.51	0.31	1.01	0.35	1.93	4.02	4.09	0.30	0.03	0.16	0.11	trace	CO ₂ none	99.89	
A2. II	1.201	.152	.002	.014	.009	.034	.065	.044			.002	.001	—			
78	68.60	16.13	2.22	0.44	0.72	1.36	4.37	4.89	0.58	0.20	0.32	0.18	trace	SO ₃ trace Cl trace BaO 0.27 SrO 0.09	100.37	
A1. I	1.143	.158	.014	.006	.018	.024	.071	.053			.004	.001	—			
79	67.44	15.78	1.58	0.85	1.43	2.38	4.11	4.87	0.70	0.32	0.32	0.21	trace	SO ₃ trace Cl trace BaO 0.24 SrO 0.09	100.32	
A1.	1.124	.154	.010	.012	.036	.043	.066	.052			.004	.001	—			
80	67.04	15.25	1.69	1.13	1.75	2.17	4.09	5.10	0.56	0.51	0.20	0.21	0.05	BaO 0.33 SrO 0.03	100.11	
A1. I	1.117	.150	.011	.015	.049	.039	.066	.055			.003	.001	—			
81	66.29	15.09	1.37	1.17	2.39	2.38	3.96	4.91	0.60	0.39	0.27	0.15	0.06	CO ₂ 0.45 BaO 0.30 SrO 0.07 Li ₂ O trace	99.85	
A1. I	1.105	.148	.009	.017	.060	.064	.064	.052			.003	.001	.001			
82	64.64	16.27	2.42	1.58	1.27	2.65	4.39	4.98	0.27	0.09	0.51	0.37	trace	CO ₂ 0.37 SO ₃ trace Cl 0.05 BaO 0.18 SrO 0.08	100.12	
A1. I	1.078	.160	.015	.022	.032	.047	.071	.053			.006	.003	—			
83	72.07	15.51	0.31	1.01	0.35	1.93	4.02	4.09	0.30	0.03	0.16	0.11	trace	CO ₂ none	99.89	
A2. II	1.201	.152	.002	.014	.009	.034	.065	.044			.002	.001	—			
84	69.95	15.14	0.38	0.83	0.56	1.45	2.70	6.36	0.91	0.40	0.24	0.10	0.08	CO ₂ 0.37 ZrO ₂ 0.02 FeS ₂ 0.39 BaO 0.13 SrO 0.02 Cu 0.03	100.06	
A1. I	1.166	.148	.002	.011	.014	.026	.043	.068			.003	.001	.001			
85	67.12	15.00	1.62	2.23	1.74	3.43	2.76	4.52	0.58	0.09	0.48	0.15	0.06	CO ₂ none SO ₃ trace Cr ₂ O ₃ none BaO 0.07 SrO 0.03 Li ₂ O trace	99.88	
A1. I	1.119	.147	.010	.031	.044	.061	.044	.048			.006	.001	.001			
86	65.91	15.32	2.28	2.02	1.52	3.28	3.08	4.80	0.60	0.60	0.59	0.18	trace	CO ₂ 0.21 S 0.02 BaO 0.10	100.51	2.651
A1. I	1.099	.150	.014	.028	.038	.059	.050	.051			.007	.001	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
72	I.4."2.3.	Q 25.50 hy 3.28 or 31.69 mt 1.39 ab 28.30 il 0.61 an 5.84 C 2.14	Felch Mountain, Michigan.	H. N. Stokes.	H. L. Smyth, U. S. G. S. Mon. 36, p. 389, 1899.	Granite.	Low sum due to H ₂ O. In W. T., p. 161.
73	I.(3)4.2.3".	Q 34.74 hy 1.66 or 22.80 mt 1.86 ab 29.34 an 6.39 C 3.06	Marquette, Fox River Valley, Wisconsin.	W. W. Daniells.	Hobbs and Leith, B. Un. Wisc. 158, p. 262, 1907.	Aporhyolite porphyry.	
74	I.4."2.3".	Q 26.82 hy 2.30 or 25.58 mt 1.16 ab 33.54 il 0.46 an 5.00 hm 1.12 C 2.14 ap 0.34	Near Ironton, Missouri.	W. H. Melville.	E. Haworth, Mo. G. S. A. R. VIII, p. 181, 1895.	Granite.	In W. T., p. 161.
75	I.(3)4.2.(2)3.	Q 34.86 hy 0.90 or 33.92 mt 0.93 ab 20.96 il 0.15 an 6.67 hm 0.16 C 0.61	Elkhorn District, Montana.	H. N. Stokes.	J. S. Barrell, U. S. G. S. A. R. 22, p. 540, 1901.	Aplite.	
76	I."4."2.(2)3.	Q 32.70 hy 1.16 or 36.14 mt 1.16 ab 22.01 il 0.61 an 5.84	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 142, 1897.	Granitite.	In W. T., p. 161. Cf. No. 87.
77	I.4.2.3(4).	Q 27.96 hy 2.22 or 24.46 mt 0.46 ab 34.06 il 0.30 an 8.62 ap 0.34 C 1.22	Mill Creek, Bitterroot Range, Montana.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. P. P. 27, p. 18, 1904.	Quartz monzonite.	Same as No. 83.
78	I.4.(1)2.3".	Q 20.34 hy 1.80 or 29.47 mt 0.46 ab 37.20 il 0.61 an 5.84 hm 1.92 C 1.33	Mount Barker, Little Belt Moun- tains, Montana.	W. F. Hille- brand.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 505, 1900.	Granite porphyry.	In W. T., p. 161.
79	I"4.2.3.	Q 18.18 di 1.08 or 28.91 hy 3.10 ab 34.58 mt 1.83 an 10.01 il 0.61 ap 0.34	Thunder Mountain, Little Belt Moun- tains, Montana.	H. N. Stokes.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 509, 1900.	Granite porphyry.	In W. T., p. 161.
80	I."4"2.3.	Q 16.68 di 1.08 or 30.58 hy 4.53 ab 34.58 mt 2.55 an 8.06 il 0.46 ap 0.51	Big Baldy Moun- tain, Little Belt Mountains, Montana.	W. F. Hille- brand.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 511, 1900.	Quartz sye- nite por- phyry.	In W. T., p. 161.
81	I(II)4"2.3.	Q 15.66 di 1.79 or 28.91 hy 7.25 ab 33.54 mt 2.09 an 8.90 il 0.46 ap 0.34	Sheep Creek, Little Belt Mountains, Montana.	W. F. Hille- brand.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 497, 1900.	Granite syenite aplite.	In W. T., p. 161.
82	I"4(5)2.3".	Q 13.68 di 0.22 or 29.47 hy 3.23 ab 37.20 mt 3.48 an 10.01 il 0.91	Barker, Little Belt, Mountains, Montana.	W. F. Hille- brand.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 466, 1900.	Syenite.	In W. T., p. 161.
83	I.4.2.3(4).	Q 27.96 hy 2.22 or 24.46 mt 0.46 ab 34.06 il 0.31 an 8.62 ap 0.34 C 1.22	Mill Creek, Bitterroot Range, Montana.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. P. P. 27, p. 18, 1904.	Quartz monzonite.	Same as No. 77.
84	I.4."2.(2)3.	Q 25.98 hy 2.32 or 37.81 mt 0.46 ab 22.53 il 0.46 an 6.39 ap 0.34 C 1.43	Modoc Mine, Butte District, Montana.	W. F. Hille- brand.	W. H. Weed, U. S. G. S. P. P. 74, p. 41, 1912.	Rhyolite porphyry.	In W. T., p. 161.
85	I(II)4.2(3).3.	Q 23.64 di 0.71 or 26.69 hy 6.18 ab 23.06 mt 2.32 an 15.29 il 0.91	Boulder, Butte District, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. P. P. 74, p. 33, 1912.	Granite.	Also in J. G., VII, p. 739, 1899. In W. T., p. 163.
86	I(II)4.2"3.	Q 20.58 di 1.54 or 28.36 hy 3.99 ab 26.20 mt 3.25 an 13.62 il 1.06 ap 0.34	Rimini, Montana.	J. G. Fairchild.	A. Knopf, U. S. G. S. rec. lab.	Quartz monzonite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
87	64.49	17.25	0.86	2.42	1.24	3.79	4.19	4.15	0.54	0.06	0.51	0.23	trace	BaO 0.30 SrO 0.08 Li ₂ O trace	100.11	
A1. I	1.075	.169	.005	.034	.031	.067	.068	.044			.006	.002	—			
88	71.26	13.94	1.01	1.35	0.67	1.64	3.96	4.35	0.55	0.26	0.56	0.10	0.55	F trace?	100.20	
A2. II	1.188	.137	.006	.019	.017	.029	.064	.047			.007	.001	.008			
89	70.18	12.97	0.82	0.86	0.95	3.98	2.89	5.40	0.29	0.18	0.54	0.26	0.55	F 0.04	99.91	
A2. II	1.170	.127	.005	.012	.019	.071	.047	.057			.007	.002	.008			
90	68.42	15.01	0.97	1.93	1.21	2.60	3.23	4.25	0.73	0.54	0.50	0.13	0.06	CO ₂ 0.20 S .02 NiO none BaO 0.12 SrO 0.03	99.95	
A1. I	1.140	.147	.006	.027	.030	.047	.051	.046			.006	.001	.001			
91	73.84	12.47	0.32	0.90	0.25	1.08	2.88	5.38	2.76				trace		99.88	
A3. III	1.231	.122	.002	.012	.006	.020	.047	.058					—			
92	71.85	13.17	2.17	1.34	0.63	2.25	4.06	3.89	0.43		0.43	0.14	0.12		100.48	
A2. II	1.198	.129	.014	.018	.016	.040	.065	.041			.008	.001	.002			
93	71.62	14.99	1.27	1.01	0.74	1.33	3.62	4.81	0.41		0.08	trace	0.17	Cl trace	100.05	
A2. II	1.194	.147	.008	.014	.019	.023	.058	.051			.001	—	.002			
94	64.40	15.77	2.47	1.15	2.12	3.54	4.10	3.81	1.93	0.31	0.40	0.16	0.04	NiO 0.17	100.37	
A2. II	1.073	.154	.015	.016	.053	.063	.066	.041			.005	.001	—			
95	69.45	14.92	3.16	0.23	0.05	1.19	3.19	5.95	1.69		0.19	0.06	0.07	BaO 0.03	100.18	
A2. II	1.158	.146	.020	.003	.001	.021	.051	.064			.002	—	.001			
96	73.50	14.87	0.95	0.42	0.29	2.14	3.46	3.56	0.90		none	none	0.03	SrO trace	100.12	
A2. II	1.225	.146	.006	.006	.007	.038	.056	.038			—	—	—			
97	68.60	16.21	1.67	1.57	1.05	2.61	3.29	3.88	0.92			0.21	0.09	CO ₂ 0.19 Cl 0.03 SrO trace	00.32	2.640
A2. II	1.143	.159	.010	.022	.026	.047	.053	.041				.001	.001			27°
98	65.51	17.01	none	2.79	0.90	3.16	3.82	4.67	1.78			0.13		Cl trace S 0.38	100.15	2.666
A3. III	1.092	.167	—	.039	.023	.056	.061	.050				.001				26°
99	75.17	12.66	0.23	1.40	0.05	0.82	2.88	5.75	0.66	0.16	0.10	0.03	trace	F 0.31 BaO 0.03 SrO trace? Li ₂ O trace	100.26	
A2. II	1.253	.124	.001	.019	.001	.014	.047	.062			.001	—	—			
100	69.52	15.44	1.90	0.09	0.17	1.70	4.54	5.04	0.27	0.33	0.23	0.14	0.08	CO ₂ 0.17 ZrO ₂ 0.05 BaO 0.19 SrO 0.04	99.90	
A1. I	1.169	.151	.012	.001	.004	.030	.073	.054			.003	.001	.001			
101	66.12	17.21	2.43	trace	0.35	2.11	4.70	5.57	0.71	0.14	0.29	0.11	0.08	ZrO ₂ 0.06 BaO 0.25 SrO 0.05	100.18	
A1. I	1.102	.169	.015	—	.009	.038	.076	.060			.004	.001	.001			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
87	I''4''2''3''.	Q 13.86 di 0.68 or 24.46 hy 5.90 ab 35.63 mt 1.16 an 15.85 il 0.92 ap 0.67	Sweet Grass Creek, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 142, 1897.	Porphyrite.	In W. T., p. 161. Cf. No. 76.
88	I.4.2.3.⊙	Q 26.34 hy 3.55 or 26.13 mt 1.22 ab 33.54 il 1.43 an 7.23 ap 0.34	White Knob, Mackay, Idaho.	C. Palmer.	J. B. Umpleby, U. S. G. S. rec. lab.	Granite porphyry.	
89	I(II).4.''2.3.	Q 25.92 di 6.09 or 31.69 wo 1.63 ab 24.63 mt 1.16 an 6.39 il 1.06 ap 0.67	White Knob, Mackay, Idaho.	C. Palmer.	J. B. Umpleby, U. S. G. S. rec. lab.	Granite porphyry.	
90	I''4.2''3.	Q 25.50 hy 5.11 or 25.58 mt 1.39 ab 26.72 il 0.92 an 12.23 ap 0.34 C 0.61	Hailey, Idaho.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. A. R. 20, III, p. 81, 1900.	Quartz monzonite.	In W. T., p. 163.
91	I.(3)4.(1)2.3.	Q 32.88 di 0.71 or 32.25 hy 1.56 ab 24.63 mt 0.46 an 4.73	Midway Geyser Basin, Yellowstone National Park.	H. N. Stokes.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 426, 1899.	Rhyolite perlite.	Also in U. S. G. S. B. 150, p. 153, 1898. In W. T., p. 163.
92	I''4.''2.3(4).	Q 29.10 di 3.06 or 22.80 hy 1.39 ab 34.06 mt 3.25 an 6.39 il 0.76 ap 0.34	Tower Creek, Yellowstone National Park.	F. A. Gooch.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 426, 1899.	Rhyolite.	In W. T., p. 163.
93	I.4.''2.3.	Q 28.08 hy 2.82 or 28.36 mt 1.86 ab 30.39 il 0.15 an 6.39 C 1.63	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 261, 1899.	Aplite.	In W. T., p. 163.
94	I(II).4.2.3(4).	Q 16.46 di 2.81 or 22.80 hy 4.00 ab 34.54 mt 2.55 an 13.07 il 0.76 hm 0.64 ap 0.34	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 261, 1899.	Quartz diorite porphyry.	In W. T., p. 163.
95	I.4.''2.3.	Q 25.50 hy 0.10 or 35.58 mt 0.46 ab 26.72 il 0.30 an 5.84 hm 2.88 C 1.02	Sunset Peak, Bear Gulch, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 325, 1899.	Rhyolite.	In W. T., p. 163.
96	I.(3)4.2.3''.	Q 34.68 hy 0.70 or 21.13 mt 1.39 ab 29.34 an 10.56 C 1.43	Prospect Mountain, Mosquito Range, Leadville District, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. Mon. 12, p. 326, 1886.	Quartz porphyry.	In W. T., p. 163.
97	I''4.2.3.	Q 27.42 hy 4.18 or 22.80 mt 2.32 ab 27.77 an 11.63 C 2.35	McNulty Gulch, Leadville, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 148, p. 176, 1897.	Granite porphyry.	In W. T., p. 163.
98	I''4''2.3.	Q 15.48 hy 7.45 or 27.80 ap 0.34 ab 31.96 an 14.73 C 0.31	Jefferson Tunnel, Leadville, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 148, p. 176, 1897.	Granite porphyry.	In W. T., p. 163.
99	I.(3)4.(1)2.''3.	Q 33.18 hy 2.34 or 34.47 mt 0.23 ab 24.62 il 0.15 an 3.89 C 0.20	Pikes Peak, Colorado.	W. F. Hille- brand.	E. B. Matthews, J. G., VIII, p. 237, 1900.	Granite.	In W. T., p. 149.
100	I.4.''2.3''.	Q 21.12 di 0.43 or 30.02 hy 0.20 ab 38.25 il 0.30 an 6.67 hm 1.90 tn 0.20 ap 0.34	Robbins Ranch, Pikes Peak, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 148, p. 163, 1897.	Rhyolite.	In W. T., p. 165.
101	I.4(5).2.3.	Q 12.60 hy 0.90 or 33.36 il 0.15 ab 39.32 hm 2.43 an 8.90 tn 0.59 ap 0.34	Wicher Mountain, Pikes Peak, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 148, p. 163, 1897.	Trachyte?	In W. T., p. 165.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
102	67.90	16.08	0.83	2.02	0.73	2.86	4.08	4.11	0.21	0.14	1.15	0.12	none	Cl 0.01	100.24	
A2. II	1.132	.158	.005	.028	.018	.051	.066	.043			.014	.001	—			
103	67.64	14.75	0.81	1.95	0.94	3.98	3.40	4.06	0.19	0.13	1.36	0.20	0.27	ZrO ₂ trace Cl 0.08	99.76	
A2. II	1.127	.145	.005	.027	.024	.071	.055	.043			.017	.001	.004			
104	66.71	15.04	0.92	1.74	1.53	2.92	3.37	5.04	0.43	0.34	1.29	0.20	0.46	ZrO ₂ none Cl 0.04	100.03	
A2. II	1.112	.147	.006	.024	.038	.052	.055	.053			.016	.001	.006			
105	64.56	17.36	0.76	1.81	0.73	3.25	3.56	5.94	0.45	0.41	0.61	0.08	0.33	ZrO ₂ trace Cl 0.01	99.86	
A2. II	1.076	.170	.005	.025	.018	.058	.057	.063			.038	—	.005			
106	71.56	14.91	1.47	1.04	0.08	1.98	3.78	4.94	0.44			trace			100.20	2.59
A3. III	1.193	.146	.009	.014	.002	.036	.061	.053				—				18°
107	70.87	15.18	2.18	0.12	0.60	1.58	3.47	5.04	1.08		trace	trace	trace		100.12	
A3. III	1.181	.149	.014	.002	.015	.029	.056	.054			—	—	—			
108	68.85	17.01	1.78	0.65	trace	1.62	3.44	5.11	1.79				trace		100.25	2.489
A3. III	1.148	.167	.011	.009	—	.029	.055	.055					—			14°
109	68.83	15.60	2.11	0.56	0.60	1.86	3.66	5.09	0.62	0.44	0.47	0.07	0.05	CO ₂ none ZrO ₂ 0.05 S 0.03 BaO 0.13 SrO none	100.17	
A1. I	1.147	.153	.013	.008	.015	.033	.059	.054			.006	—	—			
110	68.81	15.54	1.78	0.80	0.52	2.43	4.24	4.07	0.78	0.50	0.28	0.13	0.12	CO ₂ 0.48 ZrO ₂ trace BaO 0.13 SrO 0.04	100.65	
A1. I	1.147	.152	.011	.011	.013	.043	.068	.043			.004	.001	.002			
111	68.61	16.43	0.73	1.52	0.05	1.79	2.82	4.65	3.35						99.95	2.423
A3. III	1.144	.161	.005	.021	.001	.032	.045	.050								14°
112	68.14	15.29	0.35	1.66	0.26	3.03	3.59	4.07	0.39	0.40	0.36	0.17	0.12	CO ₂ 0.22 ZrO ₂ 0.01 F none FeS ₂ 1.52 NiO 0.01 BaO 0.03 SrO 0.03	99.65	
A1. I	1.136	.150	.002	.023	.007	.054	.058	.044			.005	.001	.002			
113	67.76	16.08	2.22	0.23	0.43	2.59	4.06	4.91	0.54	0.94	0.45	0.11	0.04	CO ₂ none ZrO ₂ 0.02 S 0.02 BaO 0.12 SrO 0.03	100.55	
A1. I	1.129	.158	.014	.003	.011	.046	.066	.052			.006	.001	—			
114	67.29	15.78	1.86	1.97	0.72	2.36	3.77	3.55	2.10		none	0.28	0.21	CO ₂ 0.27 SrO none Li ₂ O trace	100.16	
A2. II	1.122	.155	.012	.028	.018	.042	.061	.038			—	.002	.003			
115	65.70	15.31	2.54	1.62	1.62	2.56	3.62	4.62	0.42	0.17	0.72	0.33	trace	CO ₂ none SO ₃ 0.12 Cl 0.03 BaO 0.12 SrO 0.03 Li ₂ O trace	99.53	2.720
A1. I	1.095	.150	.015	.022	.041	.047	.058	.049			.009	.002	—			34°
116	64.93	16.79	3.54	0.32	0.65	2.11	3.33	4.76	1.65	1.12	0.53	0.17	trace	ZrO ₂ 0.03 BaO 0.15 SrO trace Li ₂ O trace	100.08	
A1. I	1.082	.165	.022	.004	.016	.038	.053	.051			.007	.001	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
102	I'' 4.2'' 3(4).	Q 21.18 hy 2.99 or 23.91 mt 1.16 ab 34.58 il 2.13 an 15.62 ap 0.34	Jennings Gulch, Monarch District, Colorado.	R. M. Butters.	R. D. Crawford, Colo. G. S. B. 4, p. 150, 1913.	Quartz monzonite gneiss.	
103	I(II) 4.2'' 3.	Q 24.06 di 4.73 or 23.91 hy 1.30 ab 28.82 mt 1.16 an 13.07 il 2.58 ap 0.34	Taylor Mountain, Monarch District, Colorado.	R. M. Butters.	R. D. Crawford, Colo. G. S. B. 4, p. 144, 1913.	Quartz monzonite.	
104	I(II) 4.2.3.	Q 19.80 di 2.26 or 29.47 hy 3.76 ab 28.82 mt 1.39 an 10.84 il 2.43 ap 0.34	Clover Mountain, Monarch District, Colorado.	R. M. Butters.	R. D. Crawford, Colo. G. S. B. 4, p. 158, 1913.	Quartz monzonite porphyry.	
105	I'' 4(5) 2.3.	Q 12.78 di 1.86 or 35.03 hy 3.12 ab 28.87 mt 1.16 an 13.90 il 1.22	Mohammed Tunnel, Monarch District, Colorado.	R. M. Butters.	R. D. Crawford, Colo. G. S. B. 4, p. 166, 1913.	Quartz latite porphyry.	
106	I 4.2.3 ⊙	Q 26.04 di 0.96 or 29.47 hy 0.26 ab 31.96 mt 2.09 an 8.90	Round Mountain, Elk Mountains, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 148, p. 177, 1897.	Rhyolite.	In W. T., p. 163.
107	I 4.2.3 ⊙	Q 26.88 hy 1.50 or 30.02 mt 0.46 ab 29.34 hm 1.92 an 8.06 C 1.02	Pennsylvania Hill, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, II, p. 324, 1896.	Rhyolite.	In W. T., p. 163.
108	I 4.2.3 ⊙	Q 25.80 mt 2.09 or 30.58 hm 0.32 ab 28.82 an 8.06 C 2.86	Summit District, Rio Grande County, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 148, p. 179, 1897.	Rhyolite.	In W. T., p. 163.
109	I 4.2.3 ⊙	Q 22.92 hy 1.50 or 30.02 mt 0.46 ab 30.92 il 0.96 an 9.17 hm 2.08 C 0.71	Lost Trail Creek, San Cristobal quadrangle, Colorado.	R. C. Wells.	W. Cross, U. S. G. S. rec. lab.	Rhyolite.	
110	I 4.2.3(4).	Q 24.60 hy 1.30 or 23.91 mt 2.09 ab 35.63 il 0.61 an 8.06 hm 0.32 C 1.22 ap 0.34	Difficulty Creek, Ouray quad- rangle, Colorado.	G. Steiger.	Cross and Howe, U. S. G. S. Fol. 153, p. 12, 1907.	Quartz latite.	
111	I'' 4.2.3.	Q 29.58 hy 2.21 or 27.80 mt 1.16 ab 23.58 an 8.90 C 3.47	Del Norte, Rio Grande County, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 148, p. 179, 1897.	Rhyolite.	In W. T., p. 163.
112	I 4.2'' 3.	Q 24.00 di 0.71 or 24.46 hy 2.71 ab 30.39 mt 0.46 an 13.34 il 0.76 ap 0.34 pr 1.52	Swan City, Breckinridge District, Colorado.	R. C. Wells.	F. L. Ransome, U. S. G. S. P. P. 75, p. 45, 1911.	Quartz monzonite porphyry.	
113	I 4.2.3 ⊙	Q 19.62 hy 1.10 or 28.91 il 0.46 ab 34.58 hm 2.22 an 11.12 tn 0.59 ap 0.34	Bachelor, Creede County, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Tridymite latite.	
114	I'' 4.2.3(4).	Q 25.26 hy 4.32 or 27.24 mt 2.78 ab 31.96 ap 0.67 an 9.73 C 2.04	Sugar Loaf, Ten Mile District, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 14, p. 227, 1894.	Quartz porphyrite.	In W. T., p. 163.
115	I'' 4.2.3.	Q 19.92 hy 4.10 or 27.24 mt 3.02 ab 30.39 il 1.37 an 11.12 hm 0.32 C 0.31 ap 0.67	Near San Miguel Peak, Telluride, Colorado.	H. N. Stokes.	W. Cross, U. S. G. S. Fol. 57, p. 6, 1899.	Quartz monzonite.	In W. T., p. 165.
116	I'' 4.2.3.	Q 22.32 hy 1.60 or 28.36 il 0.61 ab 27.77 hm 3.52 an 9.73 ru 0.48 C 2.65 ap 0.34	Greenhagh Moun- tain, Silverton, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. Fol. 120, p. 10, 1905.	Quartz latite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
117	61.85	16.22	5.07	0.69	1.50	3.60	3.87	4.14	0.78	0.66	0.68	0.15	0.08	CO ₂ 0.03 ZrO ₂ 0.02 S 0.21 BaO 0.09 SrO 0.04 Li ₂ O none	99.68	
A1. I	1.031	.159	.032	.010	.038	.064	.063	.044			.009	.001	.001			
118	74.49	14.51	0.57	0.32	trace	1.03	3.79	4.64	0.64				trace	Li ₂ O trace	99.99	
A3. III	1.242	.142	.004	.004	—	.018	.061	.050								
119	71.56	14.28	0.89	n. d.	0.42	1.18	3.00	4.37	0.79	0.36	0.38		trace	Cl 0.06 FeS ₂ 2.29 Cr ₂ O ₃ trace V ₂ O ₅ 0.02 BaO 0.08 SrO trace As trace	100.01	
A2. II	1.193	.140	.006	(.012)	.011	.021	.048	.047			.005		—			
120	69.18	14.37	2.52	0.57	0.70	1.88	3.58	5.00	0.25	0.35	0.69	0.26	0.10	Cl trace Cr ₂ O ₃ trace V ₂ O ₅ trace NiO trace MoO trace BaO 0.09 SrO trace	99.55	
A1. I	1.153	.141	.015	.008	.018	.034	.058	.053			.008	.002	.001			
121	70.67	16.24	0.37	1.15	0.26	1.71	3.95	4.85	0.64	0.29	0.23	0.11	0.03	CO ₂ trace ZrO ₂ none S 0.01 BaO 0.05	100.56	
A1. I	1.178	.159	.002	.016	.007	.030	.064	.052			.003	.001	—			
122	67.02	15.78	1.56	2.18	1.09	3.31	3.85	3.67	0.63	0.29	0.37	0.26	0.02	CO ₂ none ZrO ₂ 0.04 S 0.03 BaO 0.13	100.23	
A1. I	1.117	.155	.010	.031	.027	.059	.062	.039			.005	.002	—			
123	70.52	15.54	0.77	1.31	0.66	2.49	3.96	3.72	0.88	0.36	0.27	0.09	0.02	CO ₂ none ZrO ₂ none S trace BaO 0.03 SrO none	100.62	
A1. I	1.175	.152	.005	.018	.017	.045	.064	.039			.003	.001	—			
124	68.76	15.48	2.50	0.44	0.56	2.23	3.89	3.88	0.57	0.79	0.50	0.06	0.02	ZrO ₂ 0.03 Cl 0.03 S none Cr ₂ O ₃ none NiO none BaO 0.08 SrO none	99.82	
A1. I	1.146	.152	.016	.006	.014	.039	.063	.041			.006	—	—			
125	68.63	13.68	2.53	1.81	1.10	2.51	2.94	4.04	0.87	0.70	0.69	0.24	0.15	ZrO ₂ 0.01 FeS ₂ 0.11 BaO 0.05 SrO trace Li ₂ O trace	100.06	
A1. I	1.144	.134	.016	.025	.028	.045	.047	.043			.009	.002	.002			
126	75.01	13.88	0.74	n. d.	0.09	1.00	3.52	4.89	0.26	0.11	0.06	trace	trace	CO ₂ none BaO 0.10 SrO trace Li ₂ O trace	99.66	
A3. III	1.250	.136	.005	(.010)	.002	.018	.056	.053			.001	—	—			
127	71.24	14.11	1.75	1.23	1.07	2.87	2.37	3.97	0.59	0.11	0.42	0.17	trace	CO ₂ 0.28 BaO 0.09	100.27	2.651
A2. II	1.187	.138	.011	.017	.027	.052	.039	.043			.005	.001	—			
128	71.21	15.38	0.25	1.47	0.33	1.37	4.28	4.85	0.43	0.02	0.16	0.05	0.06	BaO 0.09	99.95	2.621
A2. II	1.187	.151	.002	.020	.008	.025	.069	.052			.002	—	—			
129	70.78	15.72	0.36	1.61	0.46	1.92	3.48	5.23	0.25	0.10	0.20	0.26	0.03	BaO 0.01 SrO trace	100.41	2.654
A2. II	1.181	.154	.002	.022	.012	.034	.056	.055			.003	.002	—			
130	69.08	13.93	2.72	1.62	0.80	3.38	3.55	3.99	1.05	0.03	0.23	0.07	trace		100.45	2.69
A2. II	1.151	.137	.017	.022	.020	.061	.057	.042			.003	—	—			
131	66.46	15.34	1.68	1.83	1.11	3.43	4.86	4.58	0.29		0.27	0.08			99.93	
A2. II	1.108	.150	.011	.025	.028	.061	.078	.049			.003	—	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
117	I(II).4''.2''.3''.	Q 14.28 di 1.94 or 24.46 hy 2.90 ab 33.01 mt 0.46 an 14.46 il 1.37 hm 4.36 ap 0.34	Millie Gulch, Lake City quad- rangle, Colorado.	R. C. Wells.	W. Cross, U. S. G. S. rec. lab.	Latite.	
118	I.(3)4.(1)2.3.	Q 32.40 mt 0.91 or 27.80 ab 31.96 an 5.00 C 1.33	Thomas Range, Utah.	L. G. Eakins.	W. Cross, Pr. Colo. Sc. Soc., II, p. 69, 1887.	Rhyolite.	In W. T., p. 165.
119	I.(3)4.''2.3.	Q 34.14 hy 1.23 or 26.13 il 0.76 ab 25.15 pr 2.29 an 5.84 C 2.45	Swansea Mine, Tintic District, Utah.	H. N. Stokes.	Tower and Smith, U. S. G. S. A. R. 19, III, p. 637, 1899.	Quartz porphyry.	In W. T., p. 165.
120	I.4.2.3⊙	Q 24.54 hy 1.80 or 30.02 mt 0.23 ab 30.39 il 1.22 an 7.51 hm 2.24 C 0.20 ap 0.67	Pinyon Creek, Tintic District, Utah.	H. N. Stokes.	Tower and Smith, U. S. G. S. A. R. 19, III, p. 634, 1899.	Rhyolite.	In W. T., p. 165.
121	I.4.2.3.⊙	Q 24.60 hy 2.15 or 28.91 mt 0.46 ab 33.54 il 0.30 an 7.51 ap 0.34 C 1.63	Clifton District, Utah.	R. C. Wells.	B. S. Butler, U. S. G. S. rec. lab.	Quartz monzonite.	
122	I''4.2''3(4).	Q 21.84 hy 4.81 or 21.68 mt 2.32 ab 32.49 il 0.76 an 14.46 ap 0.67 C 0.20	Clifton District, Utah.	R. C. Wells.	B. S. Butler, U. S. G. S. rec. lab.	Syenite.	
123	I.4.2.3(4).	Q 27.00 hy 3.02 or 21.68 mt 1.16 ab 33.54 il 0.46 an 11.08 ap 0.34 C 0.71	Granite Mountain, Ray District, Arizona.	R. C. Wells.	F. L. Ransome, U. S. G. S. rec. lab.	Quartz monzonite porphyry.	
124	I.4.2.3(4).	Q 25.80 hy 1.40 or 22.80 il 0.92 ab 33.01 hm 2.50 an 10.84 C 0.92	Old Dominion Mine, Globe District, Arizona.	W. F. Hille- brand.	F. L. Ransome, U. S. G. S. P. P. 12, p. 92, 1903.	Dacite.	
125	I''4.2.3.	Q 29.88 hy 3.00 or 23.91 mt 3.71 ab 24.63 il 1.37 an 10.56 ap 0.67 C 0.61	Lost Gulch, Globe District, Arizona.	W. F. Hille- brand.	F. L. Ransome, U. S. G. S. P. P. 12, p. 76, 1903.	Quartz monzonite.	
126	I.''4.(1)2.3.	Q 32.94 hy 1.39 or 29.46 il 0.15 ab 29.34 an 5.00 C 0.92	Skwentua River, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 231, 1900.	Alaskite.	In W. T., p. 165.
127	I''(3)4.2(3).3.	Q 34.14 hy 2.83 or 23.91 mt 2.55 ab 29.44 il 0.76 an 13.62 ap 0.34 C 0.71	Sumas Mountain, Skagit Range, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S., Mem. 38, (I), p. 527, 1912.	Granite.	
128	I.4.''2.3.	Q 23.22 hy 2.91 or 28.91 mt 0.46 ab 36.15 il 0.30 an 6.95 C 0.51	Bauerman Ridge, Okanagan Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38, (I), p. 460, 1912.	Granite.	
129	I.4.2.3.⊙	Q 25.86 hy 3.44 or 30.53 mt 0.46 ab 29.34 il 0.46 an 7.51 ap 0.67 C 1.63	Rykert Batholith, Nelson Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38, (I), p. 287, 1912.	Granite,	
130	I''4.2.3''.	Q 26.22 di 4.81 or 23.35 mt 3.94 ab 28.87 il 0.46 an 10.56	Taku Arm, Atlin District, British Columbia.	M. F. Connor.	D. D. Cairnes, Can. G. S. Mem. 37, p. 58, 1913.	Granodiorite.	
131	I(II).4(5).(1)2. 3(4).	Q 13.44 di 8.53 or 27.24 mt 2.55 ab 40.87 il 0.46 an 6.39	Kokanee Mountain, W. Kootenai District, British Columbia.	F. Dittrich.	R. W. Brock, Can. G. S. A. R. (1902), p. 99, 1903.	Granodiorite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
132	75.02	13.90	0.45	0.40	0.10	1.16	3.06	5.37	0.95		0.04	0.15	0.10		100.70	2.63
V2. II	1.250	.136	.003	.006	.003	.021	.049	.067			—	.001	.001			
133	76.26	13.43	0.11	0.06	0.04	1.06	2.95	5.44	0.51	0.19	0.07	trace	none	CO ₂ none ZrO ₂ trace S trace BaO 0.10 SrO 0.03 Li ₂ O trace	100.25	
A1. I	1.271	.132	.001	.001	.001	.019	.048	.058			.001	—	—			
134	76.03	13.39	0.48	0.31	0.05	1.28	2.98	5.18	0.34	0.15	0.07	0.03	trace	BaO 0.04 SrO trace Li ₂ O none	100.33	
A2. II	1.267	.121	.003	.005	.001	.023	.048	.055			.001	—	—			
135	75.97	13.07	0.61	0.39	0.14	1.49	2.51	5.62	0.24	0.14	0.09	trace	trace	CO ₂ none Cr ₂ O ₃ none NiO none BaO 0.14 SrO 0.03 Li ₂ O trace	100.44	
A1. I	1.266	.128	.004	.005	.004	.027	.040	.060			.001	—	—			
136	74.60	13.41	1.28	0.30	0.26	1.08	3.38	4.50	0.85		0.16	0.03	0.06	BaO 0.11 SrO none Li ₂ O trace	100.02	
A1. I	1.243	.131	.008	.004	.007	.020	.055	.048			.002	—	.001			
137	73.64	13.44	0.60	0.74	0.26	1.26	3.51	4.50	1.99		0.11	0.06	0.06	BaO 0.11 SrO 0.02 Li ₂ O trace	100.30	
A1. I	1.227	.132	.004	.010	.007	.022	.056	.048			.001	—	.001			
138	73.51	14.42	0.46	1.49	0.33	1.26	4.03	4.29	0.40			0.04	trace		100.23	
A3. III	1.225	.141	.003	.021	.008	.022	.064	.046				—	—			
139	72.48	14.06	0.89	1.05	0.62	2.17	3.30	4.75	0.35	0.16	0.28	0.09	trace	BaO 0.08 SrO trace	100.28	
A2. II	1.208	.138	.006	.015	.016	.039	.053	.051			.004	—	—			
140	72.40	14.81	0.81	0.88	0.47	1.94	3.91	3.90	0.59		0.18	0.03	0.07	BaO 0.10 SrO 0.04 Li ₂ O trace	100.13	
A1. I	1.207	.145	.005	.012	.012	.035	.063	.041			.002	—	.001			
141	71.39	14.13	0.63	0.37	0.08	1.01	2.89	5.69	3.32	0.42	0.17	0.03	trace	BaO 0.09 SrO trace Li ₂ O trace	100.22	
A2. II	1.190	.138	.004	.005	.002	.018	.047	.061			.002	—	—			
142	71.08	15.90	0.62	1.31	0.54	2.60	3.54	4.08	0.30	none	0.22	0.10	0.15	ZrO ₂ 0.08 SO ₃ none Cl 0.02 BaO 0.04 SrO 0.02 Li ₂ O trace	100.60	
A1. I	1.185	.156	.004	.018	.014	.047	.057	.043			.003	.001	.002			
143	70.75	15.13	0.98	1.43	0.73	3.09	3.05	3.62	0.51	0.10	0.42	0.10	trace	CO ₂ none FeS ₂ 0.06 NiO none BaO 0.12 SrO 0.04 Li ₂ O trace	100.13	
A1. I	1.179	.148	.006	.019	.018	.055	.049	.038			.005	.001	—			
144	70.43	15.51	0.96	1.28	0.37	2.76	2.75	5.14	0.40	0.08	0.24	0.11	trace	CO ₂ none FeS ₂ trace BaO 0.20 SrO 0.05 Li ₂ O trace	100.28	
A1. I	1.174	.152	.006	.018	.009	.049	.044	.055			.003	.001	—			
145	70.39	14.09	0.53	2.12	0.62	3.08	3.70	3.51	2.50						100.54	2.41
A3. III	1.173	.138	.003	.030	.016	.055	.059	.037								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
132	I."4.(1)2.3.	Q 34.26 hy 0.83 or 31.69 mt 0.70 ab 25.68 ap 0.34 an 5.00 C 1.22	Prospect Lake, Lake District, Vancouver, British Columbia.	M. F. Connor.	C. H. Clapp, Can. G. S. Mem. 36, p. 67, 1913.	Granite gneiss.	Salic facies. Cf. No. 1, . II.3.2.4.
133	I.(3)4.(1)2.3.	Q 35.76 hy 0.10 or 32.25 il 0.15 ab 25.15 hm 0.11 an 5.28 C 0.71	Fremont Peak, Mojave Desert, California.	W. F. Hille- brand.	J. E. Spurr, U. S. G. S. B. 228, p. 253, 1904.	Alaskite.	
134	I.(3)4.(1)2.3.	Q 36.36 di 0.46 or 30.58 wo 0.35 ab 25.15 mt 0.70 an 5.00 il 0.15	Yuba Gap, Sierra County, California.	W. F. Hille- brand.	H. W. Turner, J. G., III, p. 403, 1895.	Aplite.	Also in U. S. G. S. A. R. 17, (I), p. 721, 1896. In W. T., p. 165.
135	I.(3)4.2.(2)3.	Q 36.48 hy 0.40 or 33.36 mt 0.93 ab 20.96 il 0.15 an 7.51	East of Milton, Sierra County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 721, 1896.	Aplite.	Also in J. G., VII, p. 160, 1899. In W. T., p. 165.
136	I.(3)4."2.3.	Q 34.68 hy 0.70 or 26.68 mt 0.70 ab 28.82 il 0.30 an 5.56 hm 0.80 C 0.82	Clipper Mills, Shasta County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 192, 1887.	Rhyolite.	In W. T., p. 133.
137	I.(3)4."2.3.	Q 32.76 hy 1.49 or 26.69 mt 0.93 ab 29.34 il 0.15 an 6.12 C 0.61	Slate Creek, Tehama County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 192, 1897.	Rhyolite.	In W. T., p. 165.
138	I."4."2.3".	Q 29.70 hy 3.18 or 25.57 mt 0.70 ab 33.53 an 6.12 C 0.92	Medicine Lake, Modoc County, California.	L. G. Eakins.	J. S. Diller, U. S. G. S. B. 148, p. 228, 1897.	Rhyolite obsidian.	In W. T., p. 165.
139	I.4.2.3.⊙	Q 29.40 di 1.11 or 28.36 hy 1.73 ab 27.77 mt 1.39 an 9.45 il 0.61	Lake Tenaya, Mariposa County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 482, 1894.	Granite porphyry.	In W. T., p. 167.
140	I."4.2.3(4).	Q 29.70 hy 1.99 or 22.80 mt 1.16 ab 33.01 il 0.30 an 9.73 C 0.71	Mount Stover, Plumas County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 192, 1897.	Rhyolite.	In W. T., p. 167.
141	I."4.(1)2.3.	Q 30.24 hy 0.20 or 33.91 mt 0.70 ab 24.63 il 0.30 an 5.00 hm 0.16 C 1.22	Near Grizzly Peak, Plumas County, California.	W. F. Hille- brand.	H. W. Turner, J. G., III, p. 407, 1895	Rhyolite.	Also in U. S. G. S. A. R. 17, (I), p. 721, 1896. In W. T., p. 165.
142	I.4.2.3".	Q 28.20 hy 3.12 or 23.91 mt 0.93 ab 29.87 il 0.46 an 12.23 ap 0.34 C 1.22	El Capitan, Yosemite Valley, California.	W. Valentine.	H. W. Turner, J. G., VII, p. 143, 1899.	Biotite granite.	Also in A. J. S., VII, p. 295, 1899. In W. T., p. 165.
143	I."4.2(3).3".	Q 31.62 hy 2.86 or 21.13 mt 1.39 ab 25.68 il 0.76 an 14.46 ap 0.34 C 0.92	North Fork of Tuolumne River, Amador County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 702, 1896.	Biotite granite.	Also in J. G., VII, p. 143, 1899. In W. T., p. 185.
144	I."4.2"3.	Q 28.14 hy 2.22 or 30.59 mt 1.39 ab 23.06 il 0.46 an 12.79 ap 0.34 C 0.71	North Fork of Tuolumne River, Amador County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 702, 1896.	Biotite granite.	Also in J. G., VII, p. 143, 1899. In W. T., p. 167.
145	I"4.2.3(4).	Q 27.42 di 3.07 or 20.58 hy 3.61 ab 30.92 mt 0.70 an 11.68	Northwest Harbor, San Clemente Island, California.	W. S. T. Smith.	W. S. T. Smith, U. S. G. S. A. R. 18, II, p. 488, 1898.	Rhyolite.	In W. T., p. 167.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
146 A2. II	69.01 1.150	15.44 .151	1.28 .008	1.28 .018	0.62 .016	2.54 .045	3.85 .062	4.52 .048	0.56	0.33	0.49 .006	0.24 .002	0.01 —	CO ₂ trace S trace SrO trace	100.17	2.664
147 A3. III	67.39 1.123	15.99 .156	0.56 .003	1.99 .028	0.77 .019	1.63 .029	4.74 .076	4.80 .051	2.06						99.93	
148 A1. I	66.83 1.114	15.24 .149	2.73 .017	1.66 .023	1.63 .041	3.59 .064	3.10 .050	4.46 .048	0.56 none		0.54 .007	0.18 .001	0.10 .001	CO ₂ trace ZrO ₂ 0.04 SO ₃ none Cl 0.02 BaO 0.11 SrO 0.03	100.82	
149 B3. IV	65.81 1.097	15.11 .148	1.85 .012	1.40 .019	0.37 .009	1.98 .036	2.59 .042	5.24 .056	n. d.		0.54 .007	0.23 .002		BaO 0.10	95.22	2.38
150 A1. I	62.33 1.039	17.30 .170	3.00 .019	1.63 .022	1.05 .026	3.23 .057	4.21 .088	4.46 .048	0.75	0.44	1.05 .013	0.29 .002	0.08 .001	ZrO ₂ 0.04 FeS ₂ 0.06 V ₂ O ₅ 0.01 BaO 0.24 SrO 0.05 C 0.11	100.33	
151 A2. II	75.09 1.252	13.51 .132	1.13 .007	0.08 .001	0.18 .005	0.91 .016	3.58 .058	4.71 .050	0.25	0.17	0.22 .003	0.04 —	trace —	CO ₂ none SrO trace	99.87	
152 A2. II	72.96 1.216	12.32 .121	0.76 .005	0.03 —	0.35 .009	2.18 .039	3.24 .052	4.88 .052	1.63	0.80	0.11 .001	0.10 .001	trace —	CO ₂ 0.92 ZrO ₂ trace S none BaO trace SrO trace	100.28	
153 A2. II	72.54 1.209	13.32 .130	2.41 .015	0.09 .001	0.51 .013	1.37 .025	3.40 .055	5.25 .056	0.97	0.21	0.35 .005	0.11 .001	none —	ZrO ₂ 0.06 BaO 0.03	100.62	
154 A2. II	71.71 1.195	14.00 .137	1.06 .007	.051 .007	0.43 .011	2.25 .040	3.21 .052	4.41 .047	1.38	0.44	0.28 .004	0.07 —		CO ₂ trace SO ₃ 0.54 S none	100.29	
155 A1. I	71.60 1.193	12.44 .122	1.00 .006	0.65 .009	0.06 .002	1.90 .034	3.30 .053	4.22 .045	3.78	0.81	0.25 .003	0.08 .001	0.06 .001	CO ₂ none ZrO ₂ 0.01 BaO 0.03 SrO 0.03	100.22	
156 A1. I	63.34 1.056	15.46 .152	4.14 .026	0.39 .006	0.66 .017	2.01 .036	3.89 .063	5.31 .056	1.16	1.89	1.53 .019	0.22 .002	0.04 —	CO ₂ none BaO 0.15 SrO 0.03	100.22	
157 A1. I	71.48 1.191	13.00 .127	1.25 .008	1.55 .022	0.95 .019	2.60 .046	2.60 .042	4.24 .045	1.24	0.20	0.43 .005	0.09 .001	0.09 .001	CO ₂ 0.30 S none BaO 0.09	100.11	
158 A2. II	69.76 1.163	14.05 .138	2.05 .013	none —	0.17 .004	1.73 .030	3.90 .063	3.57 .038	3.65	0.62	0.19 .002	0.07 —	0.10 .001	BaO 0.14	100.00	
159 A1. I	65.62 1.094	15.33 .150	2.39 .015	1.46 .020	1.56 .039	3.40 .061	2.88 .047	3.78 .040	1.85		0.66 .008	0.36 .003		CO ₂ 0.24 S 0.55 SrO 0.05 Li ₂ O 0.03	100.16	

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
146	I.4.2.3".	Q 23.64 di 2.13 or 26.69 mt 1.86 ab 32.49 il 0.91 an 10.56 ap 0.67 C 0.31	Lone Pine Creek, Mount Whitney quadrangle, California.	R. C. Wells.	U. S. G. S. rec. lab.	Quartz monzonite.	
147	I.4".2.3(4).	Q 15.54 hy 5.20 or 28.36 mt 0.70 ab 39.82 an 8.06	Mono Lake, California.	W. H. Melville.	W. Lindgren, U. S. G. S. B. 150, p. 149, 1898.	Rhyolite pumice.	In W. T., p. 167.
148	I".4.2".3.	Q 22.38 di 2.16 or 26.69 hy 3.10 ab 26.20 mt 3.94 an 14.13 il 1.06 ap 0.34	Nevada Falls Trail, Yosemite Valley, California.	W. Valentine.	H. W. Turner, J. G., VII, p. 152, 1899.	Quartz monzonite.	Also in A. J. S., VII, p. 297, 1899. In W. T., p. 167.
149	I.4.2."3.	Q 28.52 hy 0.90 or 31.14 mt 2.78 ab 22.01 il 1.08 an 8.06 ap 0.67 C 2.14	Griswold Creek, Sierra Nevada, California.	G. Steiger.	F. L. Ransome, A. J. S., V, p. 363, 1898.	Latite pitchstone.	Also in U. S. G. S., B. 89, p. 58, 1898. Low sum due to H ₂ O. In W. T., p. 165.
150	I".4(5).2.3".	Q 13.02 hy 2.60 or 26.69 mt 2.32 ab 35.63 il 1.98 an 13.90 hm 1.44 C 0.41 ap 0.67	Clover Meadow, Tuolumne County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, II, p. 727, 1896.	Trachyte.	"Latite." Cf. F. L. Ran- some, U. S. G. S. B. 89, 1898. In W. T., p. 165.
151	I.(3)4.(1)2.3.	Q 34.02 hy 0.50 or 27.80 il 0.15 ab 30.39 hm 1.13 an 4.45 C 0.82	Pine Nut Range, Nevada.	H. N. Stokes.	J. E. Spurr, J. G., IX, p. 599, 1901.	Granite.	
152	I.(3)4.(1)2.3.	Q 31.80 di 1.94 or 28.91 wo 1.16 ab 27.25 hm 0.76 an 4.73 ru 0.10 ap 0.34	Meadow Creek Canyon, Nevada.	W. F. Hille- brand.	J. E. Spurr, U. S. G. S. B. 228, p. 208, 1904.	Rhyolite.	Fresh?
153	I.4.(1)2.3.	Q 29.34 di 0.65 or 31.14 hy 1.00 ab 28.82 il 0.15 an 5.28 hm 2.41 ru 0.30 ap 0.34	Red Mountain, Silver Peak Range, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 55, p. 28, 1906.	Rhyolite.	
154	I.(3)4.2.3.	Q 30.96 di 1.10 or 26.13 mt 0.70 ab 27.25 il 0.61 an 10.56 hm 0.64	Mount Brougher, Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 57, 1905.	Dacite	
155	I.(3)4.2.3.	Q 32.88 di 0.43 or 25.02 wo 0.58 ab 27.77 mt 1.39 an 6.67 il 0.46 ap 0.34	Burton Peak, Bullfrog District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. B. 407, p. 51, 1910.	Rhyolite glass.	
156	I".4".2.3.	Q 16.02 hy 1.70 or 31.14 il 0.91 ab 33.01 hm 4.14 an 8.06 ru 1.04 C 0.41 ap 0.67	Black Peak, Bull- frog District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. B. 407, p. 55, 1910.	Dacite.	
157	I".(3)4.2".3.	Q 33.42 di 0.68 or 25.02 hy 2.89 ab 22.01 mt 1.86 an 11.12 il 0.76 ap 0.34	Quinn Canyon Range, Nevada.	H. N. Stokes.	J. E. Spurr, J. G., IX, p. 602, 1901.	Granite.	
158	I".4.2.3(4).	Q 29.94 hy 0.40 or 21.13 hm 2.05 ab 33.01 ru 0.19 an 7.51 ap 0.34 C 1.02	Emigrant Road, Silver Peak Range, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 55, p. 28, 1906.	Dacite.	
159	I".4.2(3).3.	Q 25.86 hy 3.90 or 22.24 mt 1.86 ab 24.63 il 1.82 an 14.18 hm 0.48 C 1.22 ap 1.01	Aranzazu, Concep- cion del Oro, Zacatecas, Mexico.	M. Dittrich.	A. Bergeat, N. J. B. E., XXVIII, p. 438, 1909.	Granodio- rite.	Also in Bol. Inst. G. Mex. No. 27, p. 12, 1910.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
160	70.22	15.34	0.33	2.00	0.92	2.31	2.72	5.32	0.48	0.13	0.74	0.14		S none	100.65	
A2. II	1.170	.150	.020	.028	.023	.041	.044	.056			.009	.001				
161	68.40	13.59	1.32	2.41	1.26	2.34	3.89	4.24	0.85		1.10	trace	0.20	CO ₂ none ZrO ₂ trace Cl 0.03 S none BaO 0.36 CuO, PbO no.	99.99	
A1. I	1.140	.133	.008	.033	.032	.041	.063	.045			.014	—	.003			
162	71.94	13.06	2.23	0.34	0.38	1.53	3.44	4.40	1.79			0.19			99.30	2.348
A3. III	1.199	.128	.014	.005	.010	.027	.055	.046				.001				
163	75.08	13.63	1.35	0.28	0.17	1.22	3.79	4.22	0.23		0.03	0.06	trace		100.06	2.354
A2. II	1.251	.134	.009	.004	.004	.021	.061	.045			—	—	—			
164	69.58	13.72	1.95	2.30	0.34	1.54	3.57	5.19	0.78	0.52			0.09	F 0.07 S 0.19 BaO 0.12	99.96	
A2. II	1.160	.134	.012	.032	.009	.028	.058	.055					.001			
165	72.93	12.67	none	2.08	0.62	1.91	3.19	4.55	0.50	0.11	0.54	0.11	0.03	CO ₂ 0.38 ZrO ₂ 0.06 BaO 0.12	99.80	2.665
A1. I	1.216	.124	—	.029	.016	.034	.052	.049			.007	.001	—			
166	71.93	14.40	1.49	0.63	0.47	1.81	3.99	4.58	0.40		0.30	trace	trace		100.00	2.597
A3. III	1.199	.141	.009	.009	.012	.032	.065	.049			.004	—	—			
167	68.42	15.51	1.07	1.51	1.14	2.71	4.20	4.08	1.17		0.31			X 0.12	100.24	2.574
A2. II	1.140	.152	.007	.021	.029	.048	.068	.044			.004					
168	65.24	14.95	3.46	1.28	1.11	3.31	3.91	4.16	1.52		1.05	0.24	trace	CO ₂ 0.46 S 0.07	100.76	2.602
A2. II	1.087	.147	.022	.018	.028	.059	.063	.045			.013	.002	—			
169	72.90	13.85	1.85	n. d.	0.72	1.17	2.49	5.21	1.50						99.69	
A4. IV	1.215	.136	.012	(.024)	.018	.021	.040	.055								
170	72.30	12.91	0.59	2.04	0.82	1.95	3.68	4.63	0.55	0.03	0.37	0.10	0.10	S none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.03	100.10	
A1. I	1.205	.128	.004	.028	.021	.035	.060	.049			.005	.001	.001			
171	68.02	14.16	1.82	1.95	1.91	2.81	3.90	3.92	0.56	0.20	0.63	0.16	0.22	CO ₂ none NiO none BaO 0.06	100.32	
A1. I	1.134	.139	.011	.027	.048	.050	.063	.041			.008	.001	.007			
172	71.35	13.68	1.75	0.97	0.84	1.85	3.75	4.36	0.51	0.19	0.47	0.11	0.18	S none NiO none BaO 0.05	100.06	
A1. I	1.189	.134	.011	.014	.021	.033	.061	.047			.006	.001	.003			
173	71.98	13.13	1.33	1.64	0.56	1.15	2.98	4.93	1.38	0.39	0.37	0.19	0.14	Cl 0.01 BaO trace	100.18	2.63
A2. II	1.200	.129	.008	.023	.014	.021	.048	.052			.005	.001	.002			
174	70.34	13.18	2.65	2.24	0.40	1.24	3.61	4.90	0.76	0.46	0.46	0.10	0.19	Cl 0.02 BaO trace Li ₂ O trace	100.55	2.66
A2. II	1.172	.129	.017	.031	.010	.022	.058	.052			.006	.001	.003			
175	69.99	17.75	0.49	0.17	0.13	1.67	3.24	5.86	0.73						100.03	
A3. III	1.166	.174	.003	.003	.003	.030	.052	.053								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
160	I''4.2.3.	Q 23.26 hy 2.30 or 31.14 mt 4.64 ab 23.06 il 1.37 an 10.56 ap 0.34 C 1.22	Jorullo Volcano, Mexico.	F. Roel.	E. Ordonez, Cong. G. Int., X, Guide, XI, p. 55, 1906.	Diorite.	Inclusion in basalt.
161	I(II)4.2.3''.	Q 22.80 di 3.59 or 25.02 hy 3.32 ab 33.01 mt 1.86 an 6.95 il 2.13	Barima River, Northwest Dis- trict, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Gold. Br. Gui., p. 76, 1908.	Granitite.	
162	I.(3)4.1.3.	Q 32.10 hy 1.00 or 25.50 mt 1.16 ab 23.82 hm 1.44 an 0.67 ap 0.34 C 0.31	Urcu-Cui Antisana Volcano, Ecuador.	E. Esch.	E. Esch, in Reiss, Ecuador, I, p. 83, 1901.	Liparite.	
163	I.(3)4.''2.3''.	Q 34.14 hy 0.40 or 25.02 mt 0.93 ab 31.96 hm 0.80 an 5.84 C 0.71	Laguna di Marecunga, Chile.	F. v. Wolff.	F. v. Wolff, Z. D. G. G., LI, p. 546, 1899.	Liparite.	In W. T., p. 167.
164	I''4.''2.3.	Q 24.13 di 1.67 or 30.58 hy 2.81 ab 30.39 mt 2.78 an 5.84	Salto do Girao, Madeira River, Amazonas, Brazil.	G. S. Blake.	J. W. Evans, Q. J. G. S., LXII, p. 107, 1906.	Granite porphyry.	
165	I''.''4.''2.3.	Q 31.08 di 1.89 or 27.24 hy 3.54 ab 27.25 il 1.06 an 6.39 ap 0.34	Olavarria, Buenos Aires, Argentina.	M. Dittrich.	H. Backlund, Bol. Minist. Agric. Arg., No. 2B, p. 25, 1913.	Granite gneiss.	
166	I.4.2.3''.	Q 27.06 di 1.08 or 27.24 hy 0.70 ab 34.06 mt 1.16 an 7.51 il 0.61 hm 0.64	Agua de Medano, Catamarca, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 576, 1906.	Liparite.	
167	I''4.2.3(4).	Q 20.46 di 1.79 or 24.46 hy 3.36 ab 35.63 mt 1.62 an 11.12 il 0.61	Incaguasi, Jujuy, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 587, 1906.	Andesite.	
168	I(II)4.2.3''.	Q 19.20 di 2.81 or 25.02 hy 1.50 ab 33.01 mt 1.16 an 10.84 il 1.93 hm 2.72	Puerta de Aparoma, Cata- marca, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 577, 1906.	Dacitic liparite.	
169	I.(3)4.''2.''3.	Q 33.66 hy 4.97 or 30.58 ab 20.96 an 5.84 C 2.04	Smiorasair, Fannich Moun- tains, Scotland.	Barrow.	Peach et al., G. S. Scot. Mem. No. 92, p. 29, 1913.	Pegmatite.	
170	I''4.2.3.	Q 26.76 di 1.14 or 27.24 hy 4.61 ab 31.44 mt 0.93 an 7.51 il 0.76 ap 0.34	Huntley, Aberdeenshire, Scotland.	E. G. Radley.	G. S. G. Brit., Sum. Prog., (1913), p. 83, 1914.	Granite.	
171	I(II)4.2.3(4).	Q 22.14 di 2.65 or 22.80 hy 4.99 ab 33.01 mt 2.55 an 9.73 il 1.22 ap 0.34	Dalness, Glen Etive, Argyllshire, Scotland.	E. G. Radley.	H. B. Manfe, G. S. Grt. Br., Sum. Prog. (1909), p. 87, 1910.	Granite.	
172	I.4.2.3''.	Q 27.84 di 0.86 or 26.13 hy 1.70 ab 31.96 mt 2.55 an 7.23 il 0.91 ap 0.34	Glen Etive, Argyllshire, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem. No. 93, p. 92, 1912.	Granite.	
173	I.(3)4.(1)2.3.	Q 32.28 hy 2.98 or 28.91 mt 1.86 ab 25.15 il 0.76 an 5.00 ap 0.34 C 1.12	Beinn a' Chairn, Island of Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, p. 153, 1904.	Granophyre.	
174	I''4.(1)2.3.	Q 27.18 hy 2.45 or 28.91 mt 3.94 ab 30.39 il 0.91 an 5.28 ap 0.34	Druinn Eadmar da Choine, Island of Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, p. 153, 1904.	Granophyre.	
175	I.4.2.3.⊙	Q 24.78 hy 0.30 or 35.03 mt 0.70 ab 27.25 an 8.34 C 2.96	Kinstearry, Nairnshire, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VIII, p. 54, 1901.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
176	69.01	17.74	0.97	2.05	0.48	1.95	2.73	3.94	1.18		trace				100.05	
A3. III	1.150	.174	.006	.029	.012	.035	.044	.041			—					
177	75.46	12.68	0.85	0.34	1.68	1.21	2.48	5.46	0.89					CO ₂ none	101.05	2.621
B3. IV	1.258	.124	.005	.005	.042	.021	.040	.059								
178	72.30	14.60	n. d.	2.05	1.34	1.24	3.45	3.42	1.10		0.12	trace			99.62	
A4. IV	1.205	.143	—	.029	0.34	.022	.056	.036			.002	—				
179	75.50	13.50	0.95	n. d.	0.39	0.99	4.35	4.15	n. d.		0.37				100.20	
A4. IV	1.258	.132	.006	(.012)	.010	.018	.070	.044								
180	62.35	17.43	1.56	0.81	0.95	1.77	3.22	5.06	6.50		0.87				100.52	
A3. III	1.039	.171	.010	.011	.024	.032	.052	.054			.011					
181	61.50	17.90	0.86	1.44	0.53	1.29	3.20	5.03	7.50		0.70				99.95	
A3. III	1.015	.175	.005	.020	.013	.023	.052	.053			.009					
182	60.20	17.35	1.76	0.82	0.79	0.98	3.50	4.84	8.70		0.72				99.66	
A3. III	1.003	.170	.011	.011	.020	.018	.056	.051			.009					
183	73.9	13.9	1.8	n. d.	0.4	1.1	4.1	4.4	0.9						100.5	
B3. IV	1.232	.136	.011	(.022)	.010	.020	.066	.046								
184	70.10	18.40	1.72	n. d.	1.05	0.83	3.55	3.42	1.88						100.95	
A4. IV	1.168	.180	.011	(.022)	.026	.014	.057	.036								
185	69.10	15.70	0.47	2.05	2.40	0.80	2.55	4.98	2.00						100.05	
A3. III	1.152	.154	.003	.029	.060	.014	.041	.053								
186	67.50	14.60	0.43	2.00	2.35	2.88	3.80	3.93	2.00		0.78	0.06			100.27	
A2. II	1.125	.143	.003	.028	.059	.052	.061	.041			.010	—				
187	74.04	14.70	0.17	trace	0.15	1.60	2.50	5.84	2.01						101.01	
B3. IV	1.234	.144	.001	—	.004	.029	.040	.062								
188	75.74	13.71	0.55	n. d.	trace	1.26	3.72	4.69	0.46		0.17				100.30	
A4. IV	1.262	.134	.003	(.006)	—	.022	.060	.050			.002					
189	69.36	15.64	1.57	1.03	0.54	1.67	3.87	5.84	0.49		0.35	0.16	0.15	CO ₂ trace	100.67	
A2. II	1.156	.153	.010	.014	.014	.030	.063	.062			.004	.001	.002			
190	67.80	14.08	3.24	1.60	0.67	2.61	3.42	4.87	1.05		0.50	0.05	trace		99.89	
A2. II	1.130	.138	.020	.022	.017	.046	.055	.052			.006	—				
191	67.49	13.85	3.55	1.95	0.53	1.50	3.60	5.56	0.80		0.61	0.33	0.08		99.85	
A2. II	1.125	.136	.022	.027	.013	.027	.058	.060			.008	.002	.001			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
176	I.(3)4.2.3.	Q 32.10 hy 4.24 or 22.80 mt 1.89 ab 23.06 an 9.73 C 5.51	Rubislaw, Aberdeen, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VIII, p. 54, 1901.	Granite.	
177	I.(3)4."2."3.	Q 34.80 hy 4.20 or 32.80 mt 1.16 ab 20.96 an 5.84 C 0.41	Foxdale, England.	A. M. Finlay- son.	A. M. Finlayson, Q. J. G. S., LXVI, p. 304, 1910.	Granite.	
178	I".(3)4.2.3(4).	Q 32.88 hy 6.96 or 20.02 il 0.30 ab 29.34 an 6.12 C 2.96	Deux Evailles, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 37, 1913.	Granite.	
179	I."4.(1)2.3(4).	Q 31.26 hy 1.92 or 24.46 il 0.76 ab 36.68 an 5.00	Perrier, Mont Dore, Auvergne.	Pisani.	A. Lacroix, C. R., CXLVII, p. 779, 1908.	Rhyolite.	
180	I.4.2.3.⊙	Q 18.90 hy 2.40 or 30.02 il 1.67 ab 27.25 hm 1.56 an 8.90 C 3.37	Rigolet, Mont Dore, Auvergne.	Pisani.	Michel-Levy and Lacroix, C. R., CLII, p. 1202, 1911.	Trachyte pumice.	Fresh?
181	I.4."2.3.	Q 19.20 hy 2.09 or 29.75 mt 1.16 ab 27.25 il 1.37 an 6.39 C 4.79	Queurenich, Mont Dore, Auvergne.	Pisani.	Michel-Levy and Lacroix, C. R., CLII, p. 1202, 1911.	Trachyte pumice.	Fresh?
182	I.4.(1)2.3.	Q 18.30 hy 2.00 or 28.36 mt 0.46 ab 29.34 il 1.37 an 5.00 hm 1.44 C 4.59	Fougères, Mont Dore, Auvergne.	Pisani.	Levy and Lacroix, C. R., CLII, p. 1202, 1911.	Trachyte pumice.	Fresh?
183	I.4.(1)2.3".	Q 29.28 hy 3.90 or 25.58 ab 34.58 an 5.56 C 0.41	Ravin de Marus, Ardennes, France.	J. de Lapparent.	J. de Lapparent, B. Soc. Min. Fr., XXXII, p. 257, 1909.	Microgranite.	
184	I.(3)4.(1)2.3(4).	Q 32.04 hy 5.50 or 20.02 ab 29.87 an 3.89 C 7.45	Chaumeix, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Porphyry.	Al ₂ O ₃ high?
185	I(II)."4.(1)2.3.	Q 28.44 hy 9.43 or 29.47 mt 0.70 ab 21.48 an 3.89 C 4.69	Roche d'Agoux, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Porphyry.	
186	I(II).4.2.3(4).	Q 20.76 di 2.44 or 22.80 hy 6.72 ab 31.96 mt 0.70 an 11.40 il 1.52	St. Symphorien, Lyonnais, France.	Pisani.	A. Michel-Lévy, C. R., CLVI, p. 718, 1913.	Microgranu- lite.	
187	I.(3)4.2.(2)3.	Q 33.60 hy 0.40 or 34.47 hm 0.17 ab 20.96 an 8.06 C 1.33	Not stated, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 57, 1907.	Rhyolite.	
188	I."4."2.3.	Q 33.25 hy 0.53 or 27.30 il 0.30 ab 21.44 an 6.12	Lier, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 77, 1890.	Granite.	In W. T., p. 167.
189	I.4."2.3.	Q 19.44 hy 1.66 or 34.47 mt 2.32 ab 33.01 il 0.61 an 7.51 ap 0.34 C 0.10	Finse, Norway.	O. N. Heiden- reich.	V. M. Goldschmidt, Videns. Skr., No. 18, p. 6, 1912.	Granite.	
190	I".4.2.3.	Q 23.64 di 3.24 or 28.91 hy 0.20 ab 28.82 mt 3.71 an 5.62 il 0.91 hm 0.64	Riksgränsen, Lap- land, Sweden.	O. Berg.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	
191	I".4.(1)2.3.	Q 21.96 di 0.43 or 33.36 hy 1.10 ab 30.39 mt 4.64 an 5.00 il 1.22 hm 0.32 ap 0.67	Törneträsk Lake, Lapland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
192	69.59	12.94	2.51	2.07	0.96	3.35	2.69	3.71	1.09		0.70	0.47	0.09		100.17	
A2. II	1.160	.127	.016	.029	.024	.080	.044	.039			.009	.003	.001			
193	68.00	15.08	1.56	1.66	0.95	2.50	3.64	5.00	0.86		0.62		0.13		100.00	
A2. II	1.133	.148	.010	.023	.024	.045	.059	.053			.008		.002			
194	70.65	12.47	2.71	2.58	0.66	2.06	2.56	4.53	0.44		0.50		0.06	BaO 0.10	99.32	
B2. III	1.178	.122	.017	.036	.017	.037	.041	.048			.006		.001			
195	69.21	14.72	2.33	2.15	0.55	2.52	2.69	4.77	0.80				0.78		100.52	
A3. III	1.154	.144	.014	.030	.014	.045	.044	.051					.011			
196	68.79	12.85	4.07	2.16	0.70	2.60	2.30	4.97	0.67		0.55		0.49		100.15	
A2. II	1.147	.126	.026	.030	.018	.046	.037	.053			.007		.007			
197	69.92	14.78	1.54	1.75	1.05	1.88	2.92	4.16	1.51				0.43		99.94	
A3. III	1.165	.145	.009	.025	.026	.034	.047	.044					.005			
198	69.48	13.88	2.67	1.53	0.71	2.39	3.74	4.44	1.19				0.15		100.18	
A3. III	1.158	.136	.017	.021	.018	.043	.059	.047					.002			
199	69.83	15.20	2.13	0.34	0.49	1.22	3.65	5.85	0.45	(0.08)	0.37	0.10	0.05	S BaO 0.04 0.17	99.89	
A2. II	1.164	.149	.013	.005	.012	.021	.059	.063			.005	.001	—			
200	68.19	13.96	3.03	2.26	0.99	3.02	2.77	4.54	0.78		0.49	0.26	0.17		100.37	
A2. II	1.137	.137	.019	.032	.025	.054	.045	.047			.006	.002	.002			
201	73.79	13.04	0.98	1.15	0.37	2.61	2.56	4.87	0.78				0.61		100.76	
A3. III	1.230	.028	.006	.016	.009	.046	.041	.052					.009			
202	70.56	12.27	2.74	2.93	0.65	1.87	3.20	4.92	0.60		0.44	0.13	0.14		100.45	
A2. II	1.176	.120	.017	.040	.016	.034	.052	.052			.006	.001	.002			
203	71.21	13.95	0.65	2.22	0.94	2.28	2.87	4.86	0.89				0.42		100.29	
A3. III	1.187	.137	.004	.030	.024	.039	.047	.052					.006			
204	69.79	14.23	0.10	2.58	0.61	1.73	3.27	4.45	3.19				0.24		100.19	
A3. III	1.163	.140	.001	.036	.015	.030	.053	.047					.003			
205	68.55	14.73	0.37	2.56	1.39	2.83	2.88	4.10	2.34				0.73		100.48	
A3. III	1.143	.144	.002	.036	.035	.050	.047	.043					.010			
206	67.00	15.79	0.02	3.10	0.97	1.77	2.14	4.74	4.43						99.96	
A3. III	1.117	.155	—	.043	.024	.032	.034	.050								
207	75.10	12.50	0.67	0.82	0.32	1.28	2.69	5.27	0.47		0.56		0.50		100.18	
A2. II	1.252	.123	.004	.011	.008	.023	.044	.056			.007		.007			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
192	I(II).(3)4.2''3.	Q 32.34 di 1.33 or 21.68 hy 2.43 ab 23.06 mt 3.71 an 12.23 il 1.37 ap 1.01	Bräcke, Jemtland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
193	I''4.2.3.	Q 20.94 di 2.00 or 29.47 hy 2.36 ab 30.92 mt 2.32 an 10.01 il 1.22	Pilgrimsta, Jemt- land, Sweden.	E. Ostlund.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
194	I''(3)4.2.3.	Q 32.58 di 0.92 or 26.69 hy 3.08 ab 21.48 mt 3.94 an 9.17 il 0.91	Gammalkroppa, Wermland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 264, 1906.	Granite.	
195	I''4.2''3.	Q 27.18 hy 4.96 or 28.36 mt 3.25 ab 23.06 an 12.51 C 0.41	Skärjen, Nora, Wermland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 264, 1906.	Granite.	
196	I(II)''4.2''3.	Q 30.18 di 2.22 or 29.47 hy 1.26 ab 19.39 mt 6.03 an 10.01 il 1.06	Kortfors, Latorp, Wermland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 264, 1906.	Granite.	
197	I''''4.2.3.	Q 30.18 hy 5.50 or 24.46 mt 2.09 ab 24.63 an 9.45 C 2.04	Brusen, Helsing- land, Sweden.	H. Santesson.	F. Svenonius, G. F. F., X, p. 273, 1888.	Andesite breccia.	Dellenite of Brögger. In W. T., p. 169.
198	I''4.2.3.	Q 25.50 di 2.91 or 26.13 hy 1.20 ab 30.91 mt 3.94 an 8.34	Dellen, Helsing- land, Sweden.	H. Santesson.	F. Svenonius, G. F. F., X, p. 273, 1888.	Hypersthene andesite.	Dellenite of Brögger, Eg. Kg., II, p. 59, 1895. In W. T., p. 169.
199	I.4.(1)2.3.	Q 23.04 hy 1.20 or 35.03 il 0.76 ab 30.92 hm 2.13 an 5.00 C 0.92	Grenna, Lake Vättern, Sma- land, Sweden.	R. Mauzelius.	A. Gavelin, Sver. G. Und., Arsh. 5, No. 3, p. 4, 1912.	Quartz porphyry.	
200	I(II).4.2''3.	Q 27.54 di 0.43 or 26.13 hy 3.49 ab 23.58 mt 4.41 an 12.51 il 0.91 ap 0.67	Järna, Dalarne, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
201	I.(3)4.2.3.	Q 33.78 di 2.64 or 24.91 hy 2.05 ab 21.48 mt 1.39 an 9.73	Osterbergshyttan, Nora Westman- land, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
202	I(II)''4.(1)2.3.	Q 28.20 di 3.50 or 28.91 hy 2.35 ab 27.25 mt 3.94 an 4.45 il 0.91 ap 0.34	Haraldsby, Saltvik, Åland, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Finl., No. 15, p. 28, 1905.	Rapakivi granite.	
203	I''4.2.3.	Q 27.64 hy 6.62 or 28.91 mt 0.93 ab 24.63 an 10.84	Lake Mien, Blekinge, Sweden.	H. Santesson.	N. O. Holst, Abh. Sver. G. Und., No. 110, p. 37, 1890.	Rhyolite.	In W. T., p. 167.
204	I''4.2.3.	Q 27.00 hy 6.52 or 26.13 mt 0.23 ab 27.77 an 8.34 C 1.02	Lake Mien, Blekinge, Sweden.	H. Santesson.	N. O. Holst, Abh. Sver. G. Und., No. 110, p. 37, 1890.	Rhyolite.	In W. T., p. 167.
205	I(II).4.2(3).3.	Q 25.44 hy 9.31 or 23.90 mt 0.46 ab 24.62 an 13.90 C 0.41	Lake Mien, Blekinge, Sweden.	H. Santesson.	N. O. Holst, Abh. Sver. G. Und., No. 110, p. 37, 1890.	Rhyolite.	In W. T., p. 169.
206	I''(3)4.2.(2)3.	Q 28.92 hy 8.08 or 27.80 ab 17.81 an 5.90 C 3.98	Lake Mien, Blekinge, Sweden.	H. Santesson.	N. O. Holst, Abh. Sver. G. Und., No. 110, p. 37, 1890.	Rhyolite.	In W. T., p. 169.
207	I.(3)4.2.3.	Q 35.46 hy 1.72 or 31.14 mt 0.92 ab 23.06 il 1.06 an 6.39	Härsjön, Ronneby, Blekinge, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
208	72.94	12.67	1.44	1.48	0.46	1.89	3.04	5.18	0.27		0.43	0.11	0.02	S BaO 0.01 0.08	100.02	
A1. I	1.216	.124	.009	.021	.012	.034	.049	.055			.005	.001	—			
209	66.03	14.41	2.17	3.70	0.98	2.28	3.15	4.99	0.77		0.72	0.21	0.07	S BaO 0.05 0.09	99.62	
A1. I	1.101	.141	.014	.051	.025	.041	.051	.053			.009	.001	.001			
210	64.28	15.72	2.17	3.56	1.08	3.09	3.41	4.34	1.31		0.71	0.21	0.07	S BaO 0.04 0.09	100.08	
A1. I	1.071	.154	.014	.050	.027	.055	.055	.045			.009	.001	.001			
211	74.19	13.07	1.12	0.58	0.40	1.38	2.85	5.56	0.70		0.21		0.35		100.41	
A2. II	1.237	.128	.007	.008	.010	.025	.046	.060			.003		.005			
212	73.88	14.86	0.10	1.64	0.23	0.89	3.94	3.89	0.82						100.25	
A3. III	1.231	.146	.001	.023	.006	.016	.064	.041								
213	73.52	12.88	1.05	1.14	0.34	1.65	2.38	5.86	0.90		0.25	0.24	0.07		100.08	
A2. II	1.222	.126	.007	.016	.009	.030	.039	.063			.003	.002	.001			
214	71.71	12.69	2.83	0.75	0.68	1.71	2.58	5.42	0.64		0.44		0.44		99.89	
A2. II	1.195	.125	.018	.011	.017	.030	.042	.057			.006		.006			
215	68.96	13.28	5.40	0.12	0.97	2.56	3.63	3.43	0.96		0.72	0.16	0.12		100.19	
A2. II	1.146	.130	.034	.002	.024	.046	.058	.036			.009	.001	.002			
216	74.81	12.96	0.69	0.53	0.40	1.20	3.26	4.96	0.71		0.52		0.26		100.30	
A2. II	1.247	.127	.004	.007	.010	.021	.053	.053			.007		.004			
217	73.19	12.88	1.18	1.80	1.03	1.38	3.46	4.87	0.35		0.35	0.03	0.17		100.69	
A2. II	1.220	.126	.007	.025	.026	.025	.056	.052			.004	—	.002			
218	72.76	14.89	0.95	n. d.	0.46	1.26	4.25	4.50	0.54		trace		0.13		99.74	
A4. IV	1.213	.146	.006	(.012)	.012	.023	.069	.048			—		.002			
219	72.43	13.53	1.43	1.17	0.38	1.00	3.28	5.77	0.57		0.34	0.07	0.15		100.12	
A2. II	1.207	.133	.009	.017	.010	.018	.053	.062			.004	—	.002			
220	70.89	14.03	1.69	0.49	0.37	2.14	3.26	5.62	0.43		0.52		0.33		99.77	
A2. II	1.182	.137	.011	.007	.009	.038	.053	.060			.007		.005			
221	70.69	13.94	0.79	1.89	0.98	1.99	2.56	5.03	1.19		1.01		0.29		100.36	
A2. II	1.178	.137	.005	.026	.025	.036	.041	.053			.013		.004			
222	70.13	13.24	2.57	2.25	1.16	2.60	3.20	3.78	0.32		0.50	0.18	0.15		100.08	
A2. II	1.169	.130	.016	.032	.029	.046	.052	.040			.006	.001	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
208	I''4."2.3.	Q 31.32 di 2.51 or 30.58 hy 0.90 ab 25.68 mt 2.09 an 5.56 il 0.76 ap 0.34	Loftahammar, Sweden.	R. Mauzelius.	A. Gavelin, Sver. G. Und., Aarb. III, No. 7, p. 8, (1909), 1910.	Granite.	Also, A. G. Högbom, G. F. F., XXXII, p. 991, 1910.
209	I(II).4.2.3.	Q 20.94 hy 6.20 or 29.47 mt 3.25 ab 26.72 il 1.37 an 10.29 ap 0.34	Loftahammar, Sweden.	R. Mauzelius.	A. Gavelin, Sver. G. Und., Aarb. III, No. 7, p. 13, (1909), 1910.	Granite.	Also, A. G. Högbom, G. F. F., XXXII, p. 991, 1910.
210	I(II).4.2''3.	Q 18.72 hy 6.40 or 25.02 mt 3.25 ab 28.82 il 1.37 an 14.46 ap 0.34 C 0.20	Loftahammar, Sweden.	R. Mauzelius.	A. Gavelin, Sver. G. Und., Aarb. III, No. 7, p. 72, (1909), 1910.	Granite porphyry.	Also, A. G. Högbom, G. F. F., XXXII, p. 1023, 1910.
211	I."4."2."3.	Q 32.46 di 0.63 or 33.36 hy 1.06 ab 24.10 mt 1.62 an 6.12 il 0.46 C 0.20	Rörkärr, Fjällböcka, Bohuslän, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
212	I.(3)4.(1)2.3(4).	Q 32.46 hy 3.50 or 22.80 mt 0.23 ab 33.54 an 4.45 C 2.55	Björketorp, Linde, Sweden.	A. Hasselbom.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
213	I."4.2.(2)3.	Q 32.88 hy 1.82 or 35.03 mt 1.62 ab 20.44 il 0.46 an 6.39 ap 0.67 C 0.10	Björna, Angermanland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
214	I."4.2."3.	Q 31.68 di 0.86 or 31.69 hy 1.30 ab 22.01 mt 2.55 an 7.23 il 0.91 hm 1.12	Krokstrand, Strömstad, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
215	I(II)."4.2.3(4).	Q 28.92 hy 2.40 or 20.02 il 0.30 ab 30.39 tn 1.37 an 10.01 ap 0.34	Karl Johann Schlacht, Grängebirge, Sweden.	A. Grabe.	H. Johanssen, G. F. F., XXXII, p. 263, 1910.	Granite gneiss.	Igneous?
216	I."4."2.3.	Q 33.54 hy 1.00 or 29.47 mt 0.93 ab 27.77 il 1.06 an 5.84	Sönnerrhult, Hvetlanda, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
217	I''4.(1)2.3.	Q 29.28 di 1.57 or 28.91 hy 3.95 ab 29.34 mt 1.62 an 5.00 il 0.61	Vansvik, Mönsterås, Smaland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
218	I.4."2.3''.	Q 26.34 hy 3.05 or 26.69 ab 36.16 an 6.39 C 0.61	Hamphorva, Smaland, Sweden.	H. Santesson.	O. Nordenskjöld, Afh. Sver. G. Und., No. 135, p. 35, 1894.	Hälleflinta (micro- granite).	In W. T., p. 167.
219	I.4.(1)2.3.	Q 27.90 hy 1.79 or 34.47 mt 2.09 ab 27.77 il 0.61 an 5.00	Angsdal, Oskarshamn, Smaland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
220	I.4."2.3.	Q 25.98 di 1.94 or 33.36 wo 0.58 ab 27.77 mt 1.16 an 6.67 il 1.06 hm 0.96	Gershult, Oskarshamn, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
221	I''."4.2."3.	Q 30.30 hy 4.08 or 29.47 mt 1.16 ab 21.48 il 1.98 an 10.01 C 0.71	Marieholm. Oskarshamn, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
222	I(II)."4.2.3''.	Q 29.70 di 1.11 or 22.24 hy 3.95 ab 27.25 mt 3.71 an 10.66 il 0.91 ap 0.34	Högsby, Mönsterås, Smaland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
223	69.36	13.10	2.73	2.05	1.17	2.34	3.65	4.33	0.95		0.35	0.21	0.15		100.39	
A2. II	1.156	.128	.017	.029	.029	.042	.059	.045			.004	.001	.002			
224	69.14	13.53	1.55	1.94	0.63	1.75	3.29	5.24	0.90		0.74		1.37		100.08	
A?2. II	1.152	.133	.010	.027	.016	.031	.053	.055			.009		.020			
225	68.57	14.02	2.27	2.08	1.35	2.58	3.36	3.89	0.71		0.54	0.18	0.18		99.73	
A2. II	1.143	.137	.014	.029	.034	.046	.054	.041			.007	.001	.003			
226	67.62	15.18	3.41	0.91	0.87	1.93	3.03	5.03	0.66		0.84		0.49		99.97	
A2. II	1.127	.149	.021	.013	.022	.034	.048	.053			.011		.007			
227	73.30	12.77	1.87	0.74	0.44	1.32	2.86	5.56	0.90		0.38	0.12			100.26	
A2. II	1.222	.125	.012	.010	.011	.023	.046	.060			.005	.001				
228	69.63	13.11	3.31	1.25	0.69	2.09	2.90	5.07	0.26		0.93	0.25	0.25		99.74	
A2. II	1.161	.128	.021	.018	.017	.038	.047	.054			.012	.002	.004			
229	70.44	12.74	3.56	1.03	0.81	2.30	2.94	4.64	0.77		0.60	0.26	0.23	BaO 0.10	100.42	
A2. II	1.174	.125	.022	.014	.020	.041	.047	.049			.008	.002	.003			
230	73.38	14.36	0.86	0.79	0.46	1.33	2.85	4.98	0.37		0.20		0.22		99.80	
A2. II	1.223	.141	.005	.011	.012	.023	.046	.053			.003		.003			
231	73.18	13.71	0.52	1.22	0.37	1.22	2.40	5.70	0.69		0.21	0.05	0.01		99.28	
B2. III	1.220	.134	.003	.017	.009	.021	.039	.061			.003	—	—			
232	73.03	14.41	0.68	1.25	0.38	1.41	3.03	5.58	0.39		0.20	trace	trace		100.36	
A3. III	1.217	.142	.004	.018	.010	.025	.048	.060			.003	—	—			
233	71.63	16.10	1.01	n. d.	0.26	1.72	3.96	4.49	0.60						99.77	2.59
A4. IV	1.194	.158	.006	(.012)	.007	.030	.064	.048								
234	71.24	14.81	1.25	1.14	0.62	1.37	3.02	5.11	1.44		0.26	trace	trace		100.26	
A3. III	1.188	.145	.008	.016	.016	.025	.048	.054			.003	—	—			
235	71.08	14.26	1.12	2.31	0.53	0.96	3.49	5.61	0.60		0.29	trace	trace		100.25	
A3. III	1.185	.140	.007	.032	.013	.017	.056	.060			.004	—	—			
236	66.95	15.16	2.34	1.40	1.29	3.90	3.36	4.13	1.49		0.30	0.08	trace		100.40	
A2. II	1.116	.148	0.15	.019	.032	.070	.054	.044			.004	—	—			
237	68.79	14.44	1.61	3.01	0.49	1.33	2.95	6.85	0.50		0.38	trace	trace		100.35	
A3. III	1.147	.142	.010	.042	.012	.023	.048	.073			.005	—	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
223	I(II).4.2.3''.	Q 25.68 di 3.17 or 25.02 hy 2.79 ab 30.92 mt 3.94 an 6.67 il 0.61 ap 0.34	Runtorp, Kalmar, Smaland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
224	I(II).4.2.3.	Q 24.24 di 1.43 or 30.58 hy 4.57 ab 27.77 mt 2.32 an 6.95 il 1.37	Wirbo, Oskarshamn, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	MnO high?
225	I(II).4.2.3''.	Q 26.64 hy 4.85 or 22.80 mt 3.25 ab 28.30 il 1.06 an 11.68 ap 0.34	Finsjokvarn, Mönsterås, Smaland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
226	I''4.2.3.	Q 25.86 hy 2.20 or 29.47 mt 2.09 ab 25.15 il 1.67 an 9.45 hm 1.92 C 1.43	Klubb, Oskarshamn, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
227	I''4.''2.''3.	Q 32.16 di 0.22 or 33.36 hy 1.00 ab 24.10 mt 1.16 an 5.28 il 0.76 hm 1.12 ap 0.34	Slottskogen, Göteborg, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 268, 1906.	Granite gneiss.	
228	I''4.2.3.	Q 28.80 di 0.86 or 30.02 hy 1.30 ab 24.63 mt 2.32 an 7.51 il 1.82 hm 1.76 ap 0.67	Stenshafvud, Simrishamn, Skane, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite gneiss.	
229	I''4.2.3.	Q 30.90 di 1.08 or 27.24 hy 1.50 ab 24.63 mt 2.09 an 8.06 il 1.22 hm 2.08 ap 0.67	Lönkhult, Vidtsköffe, Skane, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite gneiss.	
230	I.(3)4.2.3.	Q 33.80 hy 1.99 or 29.47 mt 1.15 ab 24.10 il 0.46 an 6.39 C 1.94	Lake Raslangen, Vestana, Skane, Sweden.	H. Santesson.	H. Backström, Afh. Sver. G. Und., No. 168, p. 8, 1897.	Granite.	In W. T., p. 169.
231	I.(3)4.''2.(2)3.	Q 33.38 hy 2.35 or 33.92 mt 0.70 ab 20.44 il 0.46 an 5.84 C 1.33	Hangö, Finland.	I. G. Sundell.	V. Hackmann, B. C. G. Fin., No. 15, p. 30, 1905.	Granite.	
232	I''4.2.3.	Q 29.88 hy 2.45 or 33.36 mt 0.93 ab 25.15 il 0.46 an 6.95 C 0.92	Lörpys, Kuru, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 15, p. 31, 1905.	Granite.	
233	I.4.2.3.⊙	Q 26.58 hy 2.28 or 26.69 ab 33.54 an 8.35 C 1.63	Lestware, Umptek, Kola, Finland.	H. Berghell.	W. Ramsay, Fennia, XI, p. 72, 1894.	Granite.	In W. T., p. 169.
234	I''4.2.3.	Q 30.30 hy 2.26 or 30.02 mt 1.86 ab 25.15 il 0.46 an 6.95 C 1.84	Marrasjärvi, Rovaniemi, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 15, p. 36, 1905.	Granite.	
235	I.4.(1)2.3.	Q 25.26 hy 4.07 or 33.36 mt 1.62 ab 29.34 il 0.61 an 4.73 C 0.71	Onas, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 15, p. 37, 1905.	Granite.	
236	I(II).4.2''3.	Q 22.74 di 3.67 or 24.46 hy 1.50 ab 28.30 mt 3.48 an 13.90 il 0.61 ap 0.34	Ukonvaara, Finland.	G. Aminoff.	V. Hackmann, B. C. G. Fin., No. 15, p. 46, 1905.	Granite.	
237	I''4.(1)2.(2)3.	Q 20.28 di 0.46 or 40.59 hy 4.53 ab 25.15 mt 2.32 an 5.84 il 0.76	Nystad, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 15, p. 27, 1905.	Rapakivi granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
238	66.73	15.27	1.47	3.41	0.44	2.94	2.79	5.30	0.38	0.70	0.69	0.12	0.07		100.31	
A2, II	1.112	.150	.009	.047	.011	.053	.045	.056			.009	.001	.001			
239	66.99	13.00	2.98	2.23	0.65	2.64	3.28	4.39	0.70	0.78	0.71	0.57	0.11		99.03	
c2, IV	1.117	.127	.019	.030	.016	.047	.053	.047			.009	.004	.002			
240	65.40	14.73	1.14	2.92	1.02	2.78	3.54	4.31	1.58	0.55	1.01	0.19	0.06	CO ₂ 0.68	99.91	
A2, II	1.090	.144	.007	.040	.026	.050	.057	.046			.025	.001	—			
241	73.51	15.53	2.07	n. d.	0.39	1.12	3.01	4.93	0.29						100.85	
A4, IV	1.225	.152	.013	(.026)	.010	.020	.048	.052								
242	67.50	15.31	1.48	2.43	1.63	1.59	4.02	4.74	1.05						99.75	
A3, III	1.125	.150	.009	.033	.041	.029	.065	.050								
243	66.75	15.87	1.82	2.31	0.91	1.99	3.13	4.40	2.74						99.92	
A3, III	1.113	.155	.011	.032	.022	.038	.050	.047								
244	66.42	15.61	1.87	1.96	2.15	2.73	3.75	4.02	0.69	0.14	0.83		trace		100.17	2.691
A2, II	1.107	.153	.012	.027	.054	.048	.061	.042			.010		—			
245	65.26	16.52	1.67	1.87	1.82	2.22	4.46	4.18	1.23		0.53	0.16	trace		99.92	
A2, II	1.088	.162	.010	.026	.046	.039	.072	.044			.007	.001	—			
246	65.91	15.58	2.07	2.19	1.41	2.40	4.01	3.94	1.15		0.58	0.20		CO ₂ 0.11 SO ₂ 0.14 Org 0.15	99.84	2.613
A2, II	1.099	.153	.013	.030	.035	.043	.064	.042			.007	.001				
247	72.98	14.58	1.28	n. d.	0.69	0.94	3.22	4.57	1.44						99.70	
A4, IV	1.216	.143	.008	(.016)	.017	.017	.052	.049								
248	70.09	14.04	1.75	1.87	1.03	3.11	3.31	3.49	0.02	0.05	0.80	0.17		CO ₂ 0.54 SO ₂ 0.24	100.21	
A2, II	1.168	.138	.011	.026	.026	.055	.053	.037			.010	.001				
249	65.47	16.11	1.61	2.23	1.65	3.56	3.00	3.76	1.10	0.04	0.66	0.57		CO ₂ 0.02 SO ₂ 0.15	99.93	
A?2, II	1.091	.158	.010	.031	.041	.064	.048	.040			.008	.004				
250	63.86	17.87	1.24	2.88	0.99	3.33	4.10	3.56	0.84	0.17	0.03	0.65			99.52	
A2, II	1.064	.175	.008	.040	.025	.059	.066	.038			—	.005				
251	73.93	11.95	1.09	2.19	0.52	2.49	2.59	5.10	0.62			0.21			100.69	
A3, III	1.232	.117	.007	.031	.013	.045	.042	.054				.001				
252	70.15	13.48	3.12	2.44	0.56	2.50	3.38	4.15	0.12		0.03	0.19			100.12	
A2, II	1.169	.132	.019	.034	.014	.045	.055	.044			—	.001				
253	62.09	17.55	0.62	3.25	1.48	2.88	3.99	4.35	2.94		0.64	0.85			100.59	2.579
A2, II	1.035	.172	.004	.045	.037	.052	.065	.046			.008	.006				

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
238	I''4.2''3.	Q 22.02 hy 5.06 or 31.14 mt 2.09 ab 23.58 il 1.37 an 13.62 ap 0.34	Östersundhom, Finland.	Not stated.	L. H. Borgstrom, B. C. G. Fin., No. 22, p. 19, 1907.	Granite porphyry.	
239	I(II).4.2.3.	Q 26.16 di 1.54 or 26.13 hy 1.40 ab 27.77 mt 4.41 an 7.51 il 1.37 ap 1.34	Klondyke, Born- holm Island, Denmark.	M. Dittrich.	G. Kalb, In Diss. Greifs., p. 19, 1914.	Granite.	Sum low.
240	I(II).4.2.3.	Q 21.00 di 1.36 or 25.58 hy 2.99 ab 29.87 mt 1.62 an 11.40 il 3.80 ap 0.34	Paradisbakke, Bornholm Island, Denmark.	M. Dittrich.	G. Kalb, In. Diss. Greifs., p. 24, 1914.	Granite.	L. Milch, pers. com.
241	I.(3)4.''2.3.	Q 32.94 hy 4.43 or 28.91 ab 25.15 an 5.56 C 3.26	Serrerrhof, n. Wolfach, Schwarzwald.	H. Schwenkel.	H. Schwenkel, In. Diss. Tüb., p. 146, 1912.	Granite.	L. Milch, pers. com.
242	I''4.2.3''.	Q 18.72 hy 7.27 or 27.50 mt 2.09 ab 34.06 an 8.06 C 0.61	Zieselberg, n. Ottenhöfen, Schwarzwald.	Regelmann.	Regelmann, In. Diss. Heid., 1903.	Granite.	Osann, III, (1), 1913, p. 1.
243	I''4.2.3.	Q 24.96 hy 4.97 or 26.13 mt 2.55 ab 26.20 an 10.01 C 2.24	Brandenberg, Munsterthal, Schwarzwald.	Bunsen's laboratory.	A. Schmidt, Ref. N. J., 1889, I, p. 95.	Porphyry.	In W. T., p. 169.
244	I(II).4.2''.'3.	Q 20.04 hy 6.06 or 23.35 mt 2.78 ab 31.96 il 1.52 an 13.34 C 0.20	Tiefenstein, Albthal, Schwarzwald.	H. Hirschi.	H. Hirschi, In. Diss. Zür., p. 10, 1901.	Granite.	
245	I(II).4''2.3(4).	Q 15.90 hy 5.79 or 24.46 mt 2.32 ab 37.73 il 1.06 an 10.01 ap 0.34 C 1.02	Heidelberg, Baden.	M. Dittrich.	M. Dittrich, Mt. Bad. G. L.-A., IV, p. 74, 1900.	Granite.	Not in W. T.
246	I''4.2.3(4).	Q 20.28 hy 4.82 or 23.35 mt 3.02 ab 33.54 il 1.06 an 11.12 C 0.71	Lemberg, Nahe Thal, Rheinpreussen.	Jacobs.	K. A. Lossen, Z. D. G. G., XL, p. 203, 1888.	Quartz porphyrite.	In W. T., p. 169.
247	I.(3)4.(1)2.3.	Q 32.55 hy 3.81 or 27.24 ab 27.25 an 4.73 C 2.55	Bruderhof, Oberthal, Württemberg.	Not stated.	K. Regelmann, Erl. G. Kt. Wurt., Bl. 92, p. 34, 1908.	Granite.	
248	I''.'4.2''.'3''.	Q 29.32 di 0.89 or 20.57 hy 2.83 ab 27.77 mt 2.55 an 13.34 il 1.52 ap 0.34	Erlenweg, Darmstadt, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hess., Bl. Rossdorf, p. 41, 1912.	Granite.	Fresh?
249	I(II).4.2''3.	Q 24.42 hy 5.92 or 22.24 mt 2.32 ab 25.15 il 1.22 an 14.18 ap 1.34 C 1.94	Near Ober Ram- stadt, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hess., Bl. Rossdorf, p. 58, 1912.	Granite porphyry.	
250	I(II).4.2.3(4).	Q 18.18 hy 6.72 or 21.13 mt 1.86 ab 34.58 ap 1.68 an 11.68 C 2.96	Steinauer Ober- wald, Hesse.	Survey labora- tory.	C. Chelius, Erl. G. Kt. Hess., Bl. Neunkirchen, p. 10, 1901.	Granite.	Al ₂ O ₃ high, TiO ₂ low?
251	I''(3)4.''2.3.	Q 33.36 di 4.99 or 30.02 hy 1.92 ab 22.01 mt 1.62 an 5.84 ap 0.34	Nossert, n. Wunsiedel, Fichtelgebirge.	H. Oberembt.	H. Oberembt, In. Diss. Erl., p. 19, 1905.	Granite.	
252	I''.'4.2.3.	Q 28.26 di 2.10 or 24.46 hy 2.32 ab 28.32 mt 4.41 an 9.17 ap 0.34	Schneeberg, n. Wunsiedel, Fichtelgebirge.	H. Oberembt.	H. Oberembt, In. Diss. Erl., p. 33, 1905.	Granite gneiss.	
253	I(II).4''2.3''.	Q 14.10 hy 8.06 or 25.58 mt 0.93 ab 34.06 il 1.22 an 8.90 ap 2.02 C 2.96	Wenneberg, n. Nordlingen, Ries, Bavaria.	E. Showalter.	E. Showalter, In. Diss., Erl., p. 37, 1904.	Wenneberg- ite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
254	69.72	15.25	2.89	1.90	1.63	2.15	3.30	3.01	0.93						100.78	2.67
A3, III	1.162	.150	.018	.026	.041	.039	.053	.032								
255	66.51	16.61	3.18	2.43	1.20	1.97	2.95	3.42	1.08						99.35	
B3, IV	1.109	.163	.020	.033	.030	.036	.048	.036								
256	65.98	16.86	2.67	2.96	0.85	2.09	3.02	3.59	2.36						100.38	2.63
A3, III	1.100	.165	.017	.041	.021	.038	.048	.038								
257	64.25	18.38	2.92	2.07	1.46	2.64	3.00	4.27	1.63						100.62	2.70
A3, III	1.071	.180	.018	.029	.037	.047	.048	.046								
258	63.94	17.87	4.68	1.88	1.82	1.48	2.75	3.56	1.91						99.79	2.67
A3, III	1.066	.175	.029	.026	.046	.027	.045	.038								
259	69.57	13.79	2.54	0.67	0.52	1.43	3.89	5.14	1.62		0.45	trace	trace	CO ₂ 0.20	99.82	2.603
A2, II	1.160	.135	.016	.009	.013	.025	.063	.054			.006	—	—			
260	65.09	15.22	2.32	3.09	0.70	2.69	4.18	4.82	0.43		0.69	0.26	0.12	CO ₂ 0.19 ZrO ₂ 0.06	99.86	2.649
A2, II	1.085	.149	.014	.043	.018	.048	.068	.051			.009	.002	.002			
261	74.97	12.58	0.26	1.41	0.10	0.93	2.75	5.74	0.52		0.26	trace		SO ₃ trace	99.52	2.605
A3, III	1.250	.123	.002	.019	.003	.016	.044	.061			.003	—				
262	74.62	12.87	0.78	1.07	0.15	0.95	2.89	5.74	0.41			0.08		SO ₃ 0.20	99.76	2.623
A3, III	1.241	.126	.005	.015	.004	.017	.047	.061				—				
263	72.67	13.44	1.06	1.56	0.23	1.15	3.08	5.75	0.88		trace	0.12		SO ₃ 0.26	100.20	2.635
A3, III	1.211	.132	.007	.022	.006	.021	.050	.062			—	.001				
264	71.95	13.29	1.32	2.45	0.27	1.00	3.07	4.98	1.20			0.12		SO ₃ 0.10	99.75	2.598
A3, III	1.199	.130	.008	.034	.007	.018	.050	.053				.001				
265	71.80	13.87	0.89	1.99	0.36	1.57	3.23	5.32	0.64		0.42	0.13		CO ₂ 0.06 SO ₃ 0.15	100.43	2.598
A2, II	1.197	.136	.006	.028	.009	.028	.052	.056			.005	.001				
266	71.21	13.08	0.39	3.62	0.40	1.56	3.18	4.57	1.01		0.48	0.14		SO ₃ 0.18	99.82	
A2, II	1.187	.128	.003	.050	.010	.028	.052	.049			.006	.001				
267	69.88	14.04	0.86	2.74	0.60	1.81	3.52	4.73	0.90			0.13	trace	SO ₃ 0.12	99.30	
B3, IV	1.165	.138	.005	.038	.015	.032	.056	.050				.001	—			
268	69.85	13.61	0.80	4.09	1.03	2.18	3.53	3.30	0.83		0.53	0.10		SO ₃ 0.23	100.08	2.694
A2, II	1.164	.133	.005	.057	.026	.039	.056	.035			.007	.001				

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
254	I''.(3)4.2''.3(4).	Q 31.50 hy 5.16 or 17.79 mt 4.18 ab 27.77 an 10.84 C 2.65	Kamm, Lausitz, Saxony.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 26, 1902.	Granite.	
255	I(II).(3)4.2.3''.	Q 29.40 hy 4.72 or 20.02 mt 4.64 ab 25.15 an 10.01 C 4.39	Klotzsche, Lausitz, Saxony.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 27, 1902.	Granite.	Squeezed.
256	I(II)''4.2.3.	Q 27.78 hy 5.27 or 21.13 mt 3.94 ab 25.15 an 10.58 C 4.18	Weberberg, Lausitz, Saxony.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 26, 1902.	Granite.	Squeezed.
257	I(II).4.2''.3.	Q 21.90 hy 5.15 or 23.58 mt 4.18 ab 25.15 an 13.07 C 2.96	Kohlhaustrasse, Lausitz, Saxony.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 26, 1902.	Granite.	
258	I(II).(3)4.2.3.	Q 28.08 hy 4.60 or 21.13 mt 6.03 ab 23.58 hm 0.48 an 7.51 C 6.63	Georgenthal, Lausitz, Saxony.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 26, 1902.	Granite.	
259	I.4.(1)2.3.	Q 24.12 di 1.51 or 30.02 hy 0.60 ab 33.01 mt 0.70 an 5.00 il 0.91 hm 2.08	Spitzberg, n. Grimma, Saxony.	C. Ambronn.	C. Ambronn, In. Diss. Leip., p. 32, 1907.	Quartz porphyry.	
260	I(II).4''.2.3''.	Q 15.60 di 2.57 or 28.36 hy 3.41 ab 35.63 mt 3.25 an 8.34 il 1.37 ap 0.67	Kleinsteinsberg, n. Beucha, Saxony.	C. Ambronn.	C. Ambronn, In. Diss. Leip., p. 27, 1907.	Quartz porphyry.	
261	I.(3)4.(1)2''.3.	Q 34.26 hy 2.15 or 33.92 mt 0.46 ab 23.06 il 0.46 an 4.45 C 0.20	Meineckenberg, Ilsethal, Harz.	Hampe.	K. A. Lossen, Z. D. G. G., XL, p. 204, 1888.	Granite porphyry.	In W. T., p. 153.
262	I''4.(1)2''.3.	Q 32.88 hy 1.53 or 33.92 mt 1.16 ab 24.63 an 4.73 C 0.10	Karlsklippe, n. Plessenburg, Brocken, Harz.	Eyme.	O. H. Erdmannsdörfer, Jb. Pr. G. L.-A., XXXVII, p. 350, 1906.	Granite porphyry.	
263	I.4.(1)2.3.	Q 28.92 hy 2.58 or 34.47 mt 1.62 ab 26.20 ap 0.34 an 5.00 C 0.20	Schneeloch, Brocken, Harz.	Eyme.	O. H. Erdmannsdörfer, Jb. Pr. G. L.-A., XXXVII, p. 342, 1906.	Granite.	
264	I''4.(1)2.3.	Q 31.08 hy 4.13 or 29.47 mt 1.86 ab 26.20 ap 0.31 an 4.17 C 1.22	Rehberger Graben, Brocken, Harz.	Eyme.	O. H. Erdmannsdörfer, Jb. Pr. G. L.-A., XXXVII, p. 342, 1906.	Granite. porphyry.	
265	I.4.2.3.⊙	Q 28.38 hy 3.14 or 31.14 mt 1.39 ab 27.25 il 0.76 an 6.95 ap 0.34 C 0.31	Klein Birkenkopf, Brocken, Harz.	Jakobs.	O. H. Erdmannsdörfer, Jb. Pr. G. L.-A., XXVII, p. 343, 1906.	Granite.	Micropegma- titic.
266	I''4.2.3.	Q 28.80 hy 6.41 or 27.24 mt 0.70 ab 27.25 il 0.91 an 6.95 ap 0.34 C 0.21	Wolfsklippen, Brocken, Harz.	Eyme.	O. H. Erdmanns- dörfer, Jb. Pr. G. L.-A., XXXII, p. 353, (1911), 1912.	Granite.	
267	I''4.2.3.	Q 25.38 hy 5.86 or 27.80 mt 1.16 ab 26.34 ap 0.34 an 8.06 C 0.31	Renneckenberg, Brocken, Harz.	Schade.	O. H. Erdmanns- dörfer, Jb. Pr. G. L.-A., XXVII, p. 353, 1906.	Granite.	Inclosure in granite.
268	I''4.2.3(4).	Q 28.50 hy 8.54 or 19.46 mt 1.16 ab 29.34 il 1.06 an 10.01 ap 0.34 C 0.61	Tannenklinz, Brocken, Harz.	Hesse.	O. H. Erdmanns- dörfer, Jb. Pr. G. L.-A., XXVII, p. 354, 1906.	Inclosure in granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
269	68.85	14.35	1.00	3.55	0.64	2.21	3.06	4.98	0.71			0.17		SO ₃ 0.38	99.90	2.682
A3. III	1.148	.141	.006	.050	.016	.039	.049	.053				.001				
270	69.94	13.45	0.49	4.64	0.67	2.26	2.42	4.25	0.77		0.45	0.23		SO ₃ 0.14	99.71	2.712
A2. II	1.166	.132	.003	.064	.017	.040	.039	.046			.006	.002				
271	72.45	13.19	1.43	1.20	0.77	1.72	3.81	4.50	0.63			0.25			99.95	
A3. III	1.208	.129	.009	.017	.019	.030	.061	.048				.002				
272	71.62	12.74	1.06	1.94	1.37	1.91	3.36	4.76	0.99		0.14	0.53			100.42	
A2. II	1.194	.125	.007	.027	.034	.034	.054	.051			.002	.004				
273	68.64	14.39	1.44	2.76	0.76	1.59	3.95	5.30	0.75		0.17	0.24			100.02	
A2. II	1.144	.141	.009	.039	.019	.029	.064	.056			.002	.002				
274	71.53	13.55	1.20	0.88	1.45	3.21	2.61	3.95	1.75						100.13	
A3. III	1.192	.133	.007	.012	.036	.057	.042	.042								
275	70.44	15.63	1.34	1.12	0.55	1.98	4.03	5.18	0.55						100.82	
A3. III	1.174	.153	.008	.015	.014	.036	.065	.055								
276	67.90	13.93	3.05	0.49	0.94	3.11	3.40	3.67	1.30	0.92	0.76	0.39	trace	ZrO ₂ trace if 0.06	99.92	2.621
A2. II	1.132	.187	.019	.007	.024	.055	.055	.039			.010	.003	—			
277	66.86	16.70	1.06	2.07	1.62	2.70	3.32	4.55	0.53		0.43	0.12		S 0.01	99.96	
A2. II	1.114	.164	.007	.029	.041	.048	.053	.049			.003	.002				
278	72.79	13.77	1.69	n. d.	0.28	1.24	3.39	4.38	2.41						99.95	2.416
A4. IV	1.213	.135	.011	(.022)	.007	.022	.055	.047								
279	72.48	12.68	2.31	n. d.	0.73	2.39	3.30	4.35	1.31						99.55	2.458
A4. IV	1.208	.124	.014	(.028)	.018	.043	.053	.047								
280	70.53	15.79	2.08	2.15	0.47	1.81	3.47	3.67	0.29						100.26	
A3. III	1.176	.155	.013	.030	.012	.032	.056	.039								
281	67.99	17.54	1.17	0.82	0.13	1.44	4.92	5.78	0.05						99.84	
A3. III	1.133	.172	.007	.011	.003	.026	.079	.062								
282	65.08	15.95	2.25	2.04	0.53	3.47	4.54	4.31	1.26		0.16	0.13	trace		99.72	
A2. II	1.085	.156	.014	.028	.013	.063	.073	.046			.002	.001	—			
283	70.07	14.46	2.21	1.63	1.17	2.90	3.07	3.98	0.48	0.13	0.49		trace	Cr ₂ O ₃ trace	100.59	2.717
A3. III	1.168	.142	.014	.022	.029	.052	.050	.042			.006		—			10°
284	69.22	14.29	2.12	2.33	1.27	3.16	3.29	3.52	0.69	0.10	0.36				100.35	2.679
A3. III	1.154	.140	.013	.032	.032	.056	.058	.037			.005					10°

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
269	I''4.2.3.	Q 24.24 hy 7.41 or 29.47 mt 1.39 ab 25.68 ap 0.34 an 10.01 C 0.31	Plessenburg, Brocken, Harz.	Eyme.	O. H. Erdmanns- dörfer, Jb. Pr. G. L.-A., XXVII, p. 346, 1906.	Granite.	
270	I(II).(3)4.2.3.	Q 31.08 hy 8.96 or 25.58 mt 0.70 ab 20.44 il 0.91 an 9.17 ap 0.67 C 1.43	Elbingerode, Harz.	Fischer.	K. A. Lossen, Z. D. G. G., XL, p. 203, 1888.	Quartz porphyrite.	In W. T., p. 169.
271	I''4.(1)2.3.	Q 29.04 di 0.68 or 26.69 hy 2.62 ab 31.96 mt 2.09 an 5.56 ap 0.67	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 25, 1909.	Granite.	Also in Milch and Riegner, N. J. B. B., XXIX, p. 360, 1910.
272	I''4.''2.3.	Q 28.26 di 0.22 or 28.36 hy 5.63 ab 28.30 mt 1.62 an 5.56 il 0.30 ap 1.34	Reichenberg, Riesengebirge, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 44, 1909.	Aplite.	Schliere in granite.
273	I''4.(1)2.3.	Q 20.10 hy 5.60 or 31.14 mt 2.09 ab 33.54 il 0.30 an 5.84 ap 0.67	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 31, 1909.	Border of schliere in granite.	Also in Milch and Riegner, as above. Cf. No. 270, above, and No. 181, I.4.1.3.
274	I''(3)4.2(3).3.	Q 32.46 di 1.76 or 23.35 hy 3.43 ab 22.01 mt 1.62 an 13.62	Pfaffenberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 162, 1899.	Granitite.	In W. T., p. 169.
275	I.4.2.3.⊙	Q 21.84 di 0.68 or 30.58 hy 1.99 ab 34.06 mt 1.86 an 9.17	Topla, S. Carinthia, Austria.	H. V. Graber.	H. V. Graber, Jb. G. R.-A. Wien, XLVII, p. 278, 1897.	Granite.	In W. T., p. 171.
276	I''4.2''.3''.	Q 27.36 hy 2.40 or 21.68 il 1.06 ab 23.82 hm 3.05 an 11.95 tn 0.39 ap 1.01	Miekinia, n. Cracow, Galicia.	Z. Rozen.	Z. Rozen, B. Ac. Sci. Crac., 1909, (2), p. 810.	Quartz porphyry.	
277	I(II).4.2.3.	Q 21.66 hy 7.27 or 27.24 mt 1.62 ab 27.77 ap 1.01 an 10.56 C 2.45	Bobrau, Moravia, Austria.	C. von John.	von John and Suess, Jb. G. R.-A. Wien, LVIII, p. 262, 1908.	Granitite.	
278	I''4.''2.3.	Q 31.68 hy 3.60 or 26.13 ab 29.22 an 6.12 C 1.12	Hlinik, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 444, 1887.	Obsidian.	In W. T., p. 171.
279	I''4.2.3.	Q 29.70 di 4.48 or 26.13 hy 3.21 ab 27.77 an 6.67	Apate, Schemnitz, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 448, 1887.	Liparite.	In W. T., p. 171.
280	I''4.2.3''.	Q 30.78 hy 3.44 or 21.68 mt 3.02 ab 29.34 an 8.90 C 2.86	Hauszerstollen, Aranyida, Hungary.	B. Horvath.	Emszt and Horvath, Mt. Ung. G. R.-A., XIX, p. 286, 1912.	Granite.	
281	I.4(5).(1)2.3.	Q 13.68 hy 0.83 or 34.47 mt 1.62 ab 41.40 an 7.23 C 0.51	Halasag, Ditro, Siebenburgen, Hungary.	J. v. Szadeczky.	J. v. Szadeczky, Ref. N. J., 1901, I, p. 402.	Quartz nordmark- ite.	In W. T., p. 171.
282	I(II).4''.2.3(4).	Q 14.94 di 5.32 or 25.58 hy 0.23 ab 38.25 mt 3.25 an 10.29 il 0.30 ap 0.34	Oravicabanya, Krasso-Szőreny, Hungary.	K. Emszt.	Rozloznit and Emszt, Mt. Ung. G. R.-A., XVI, p. 197, 1908.	Gabbro- diorite aplite.	
283	I''4.2(3).3.	Q 28.98 di 0.43 or 23.35 hy 2.96 ab 26.20 mt 3.25 an 13.90 il 0.01	Tumpeursteig, Oetzthal, Tyrol.	H. Hirschi.	H. Hirschi, In. Diss. Zür., p. 28, 1901.	Tonalite gneiss.	
284	I(II).4.2(3).3''.	Q 27.72 di 1.36 or 20.57 hy 4.38 ab 27.77 mt 3.02 an 13.90 il 0.76	Lana, n. Meran, Tyrol.	H. Hirschi.	H. Hirschi, In. Diss. Zür., p. 13, 1901.	Tonalite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
285	71.17	13.07	1.29	2.36	0.88	1.61	3.13	4.20	2.54	0.32	trace	trace	trace		100.57	2.657
A3. III	1.186	.128	.008	.033	.022	.029	.050	.045								
286	69.21	14.71	1.69	2.30	1.37	3.26	3.38	3.83	0.79		0.32	trace	0.04		100.90	2.679
A2. II	1.154	.144	.011	.046	.034	.059	.055	.040			.004	—	—			
287	67.81	15.04	2.34	2.75	1.18	3.01	3.35	4.26	1.01		0.32	trace	trace		100.75	2.71
A2. II	1.130	.147	.015	.039	.030	.054	.054	.046			.004	—	—			
288	66.56	15.26	1.97	1.64	1.15	2.09	3.72	6.38	0.57		0.46	0.15	trace		99.95	
A2. II	1.109	.150	.013	.023	.029	.038	.060	.068			.006	.001	—			
289	71.98	14.35	1.14	0.50	0.64	1.34	4.33	4.51	0.55	0.06	0.16	0.07			99.63	2.62
A2. II	1.200	.141	.007	.007	.016	.024	.069	.048			.002	—				
290	71.40	15.57	0.53	0.41	0.73	2.28	4.10	4.34	0.54	0.03	0.18				100.14	2.65
A3. III	1.190	.153	.003	.006	.018	.041	.066	.046			.002					
291	68.21	16.36	0.77	0.98	0.58	1.86	4.29	5.81	0.60	0.11	0.24				99.91	2.63
A3. III	1.137	.160	.005	.014	.015	.033	.069	.062			.003					
292	66.32	15.29	1.28	1.79	2.27	3.20	3.95	4.56	1.01	0.14	0.47				100.28	2.71
A3. III	1.105	.150	.008	.025	.057	.057	.064	.049			.006					
293	66.19	17.52	1.85	0.89	1.24	3.04	2.62	4.75	1.17	0.07	0.54				99.88	2.73
A3. III	1.103	.172	.012	.013	.031	.054	.042	.051			.007					
294	65.49	15.87	3.51	0.94	0.82	2.20	4.10	4.32	2.10	0.12	0.57				100.04	2.69
A3. III	1.092	.156	.022	.013	.021	.039	.066	.046			.007					
295	71.93	14.71	1.62	0.85	0.24	1.83	3.58	4.21	0.80	0.08	0.45	0.18	0.05		100.53	2.67
A2. II	1.199	.144	.010	.012	.006	.032	.058	.045			.006	.001	—			
296	70.52	15.61	0.50	0.97	0.67	2.32	3.32	4.38	0.92	0.02	0.27	0.24	0.04		99.78	2.70
A2. II	1.175	.153	.003	.014	.017	.041	.053	.047			.003	.002	—			
297	75.40	13.38	n. d.	1.29	0.32	1.28	3.93	4.59	0.51						100.70	
A4. IV	1.257	.131	—	.018	.008	.023	.063	.049								
298	71.25	13.67	1.67	0.43	1.01	2.41	4.22	4.13	0.94	0.20	0.32				100.25	2.691
A3. III	1.188	.134	.010	.006	.025	.043	.068	.043			.004					
299	69.70	14.84	0.22	2.87	0.80	2.32	3.47	4.48	1.80	0.20				CO ₂ 0.18	100.88	2.652
A3. III	1.162	.146	.001	.040	.020	.041	.056	.048								
300	75.15	13.20	0.37	0.67	0.19	1.49	3.07	5.12	0.57	trace	trace	0.22	0.02		100.07	2.62
A2. II	1.253	.129	.002	.009	.005	.027	.050	.054			—	.002	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
285	I''4.2.3.	Q 30.66 hy 5.50 or 25.02 mt 1.86 ab 26.20 an 8.06 C 0.41	Lana, n. Meran, Ulten Massif, Tyrol.	F. Erben.	F. Becke, Ds. Ak. W. Wien, LXXV, (1), p. 160, 1913.	Quartz porphyrite.	
286	I(II).4.2''.3''.	Q 24.66 di 2.32 or 22.24 hy 6.33 ab 23.82 mt 2.55 an 13.62 il 0.61	Gaul, n. Lana, Ulten Massif, Tyrol.	F. Erben.	F. Becke, Ds. Ak. W. Wien, LXXV, (1), p. 160, 1913.	Quartz diorite.	
287	I''4.2''.3.	Q 22.74 di 1.61 or 25.53 hy 4.84 ab 28.30 mt 3.48 an 13.07 il 0.61	Gaul, n. Lana, Ulten Massif, Tyrol.	F. Erben.	F. Becke, Ds. Ak. W. Wien, LXXV, (1), p. 160, 1913.	Concretion in quartz diorite.	
288	I''4''.(1)2.3.	Q 15.06 di 2.87 or 37.81 hy 2.06 ab 31.44 mt 3.02 an 6.12 il 0.91 ap 0.34	n. Canzacoli, Predazzo, Tyrol.	M. Dittrich.	J. Romberg, Sb. Pr. Ak. Wiss., 1902, I, p. 701.	Monzonite aplite.	
289	I.4.2.3''.	Q 26.04 hy 1.60 or 26.69 mt 1.16 ab 36.15 il 0.30 an 6.67 hm 0.32	Valufirn, Ponteglia Gebiet, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Quartz diorite.	
290	I.4.2.3''.	Q 25.02 hy 1.93 or 25.58 mt 0.70 ab 34.58 il 0.30 an 11.40	Ponteglia Glacier, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Aplite (?).	Acid portion of dike. Cf. No. 183, II.5.3.4.
291	I.4''.2.3.	Q 16.08 di 0.89 or 34.47 hy 1.88 ab 36.15 mt 1.16 an 8.06 il 0.46	Piz Posta Biella, Ponteglia Gebiet, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite.	
292	I(II).4''.2.3''.	Q 15.90 di 4.42 or 27.24 hy 5.06 ab 33.54 mt 1.86 an 10.29 il 0.91	Val Ponteglia, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite porphyry.	
293	I''4.2(3).3.	Q 24.36 hy 3.10 or 23.36 mt 1.39 ab 22.01 il 1.06 an 15.01 hm 0.96 C 2.55	Piz Tumbif, Ponteglia Gebiet, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite.	
294	I''4.2.3''.	Q 19.26 hy 2.10 or 25.58 mt 1.39 ab 34.58 il 1.06 an 10.84 hm 2.56 C 0.61	Piz Ner, Ponteglia Gebiet, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite porphyry.	
295	I''4.2.3''.	Q 31.02 hy 0.60 or 25.02 mt 1.39 ab 30.39 il 0.91 an 8.06 hm 0.64 C 1.22 ap 0.34	Tschirva Road, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite.	
296	I.4''.2.3.	Q 28.92 hy 2.76 or 26.13 mt 0.70 ab 27.77 il 0.46 an 9.45 ap 0.67 C 1.94	Tschirvahütte, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Monzonite aplite.	
297	I''4.(1)2.3.	Q 31.02 di 0.96 or 27.24 hy 2.68 ab 33.01 an 5.28	Bietschhorn, Aarmassif, Switzerland.	L. Duparc.	E. v. Fellenberg, Btr. G. Kt. Schw., XXI, p. 22, 1893.	Granite gneiss.	Not in W. T.
298	I''4.''2.3(4).	Q 25.86 di 4.32 or 23.91 hy 0.50 ab 35.63 mt 0.46 an 6.39 il 0.61 hm 1.28	Klein Mutsch, Piz Giuf, Aarmassif, Switzerland.	Not stated.	F. Weber, Btr. G. Kt. Schw., XIV, p. 94, 1904.	Granite. porphyry.	
299	I''4.2.3.	Q 23.82 hy 7.15 or 26.69 mt 0.23 ab 29.34 an 11.40 C 0.10	Gasteren, Aarmassif, Switzerland.	L. Duparc.	E. v. Fellenberg, Btr. G. Kt. Schw., XXI, p. 45, 1893.	Porphyry.	Not in W. T.
300	I.(3)4.''2.3.	Q 34.62 hy 1.42 or 30.02 mt 0.46 ab 26.20 ap 0.67 an 5.56 C 0.51	Somvix, Gotthardmassif, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Aplite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
301	74.16	13.73	0.48	0.29	0.13	0.93	3.55	5.65	0.42	0.07					99.41	
A3. III	1.236	.135	.003	.004	.003	.017	.057	.061								
302	73.62	12.96	2.25	0.75	0.45	1.81	3.24	3.92	0.68	0.08	0.33				100.09	2.62
A3. III	1.227	.127	.014	.010	.011	.032	.052	.041			.004					
303	68.64	15.91	0.58	1.35	0.62	2.86	3.49	5.18	0.51	0.14	0.27	0.08	0.04		99.67	2.68
A2. II	1.144	.156	.004	.019	.016	.051	.056	.055			.003	—	—			
304	66.38	14.84	1.09	2.71	1.52	2.98	4.23	4.16	1.94	0.13	0.34				100.32	2.712
A3. III	1.106	.146	.007	.038	.038	.054	.068	.045			.004					
305	69.46	14.08	2.01	0.92	1.04	1.52	2.54	6.08	1.62		0.32				99.59	2.701
A3. III	1.158	.138	.013	.013	.026	.027	.041	.065			.004					
306	68.89	14.05	2.18	1.43	0.83	2.15	4.56	4.30	0.41		0.23	0.03	trace	ZrO ₂ trace B ₂ O ₃ 0.38 Cl 0.07 F 0.05 FeS ₂ 0.49 Ce ₂ O ₃ trace BaO 0.58 Cu 0.03 Pb 0.04	101.00	
A4. IV	1.148	.138	.014	.019	.021	.039	.073	.046			.003	—				
307	73.90	15.20	trace	none	trace	1.20	4.49	4.14	0.36	0.07		0.09			99.45	2.60
A4. IV	1.232	.149	—	—	—	.021	.073	.044					—			
308	67.61	16.60	1.12	2.26	1.55	2.61	4.14	4.01	0.88		trace	0.17			100.95	
B2. III	1.127	.163	.007	.032	.039	.046	.067	.042			—	.001				
309	65.71	16.46	0.96	3.04	1.09	3.05	3.03	5.04	1.83		trace				100.21	
A3. III	1.095	.161	.006	.042	.027	.054	.048	.054			—					
310	65.58	15.79	0.94	2.44	1.47	3.08	2.58	5.67	1.16		0.58	trace	trace	SO ₃ 0.19 Cl trace X 0.73 Li ₂ O trace	100.21	2.527
A2. II	1.093	.155	.006	.034	.037	.055	.042	.060			.007	—	—			15°
311	65.32	15.34	1.22	2.18	1.51	2.99	2.75	5.70	1.97		0.40		trace	SO ₃ 0.03 Cl 0.05 X 0.57	101.03	2.552
B2. III	1.089	.150	.008	.030	.038	.053	.044	.061			.005		—			15°
312	65.31	16.36	0.68	1.68	1.06	2.85	2.78	5.97	1.01		0.47	trace	trace	SO ₃ none Cl trace X 1.29 FeS ₂ 0.85	100.31	2.546
A2. II	1.089	.160	.004	.023	.027	.051	.045	.064			.006	—	—			15°
313	64.76	16.48	0.74	2.74	1.74	3.24	2.67	5.49	1.62		0.42	trace	trace	SO ₃ 0.08 Cl 0.01 X 0.33 Li ₂ O trace	100.32	2.562
A2. II	1.079	.162	.005	.038	.044	.058	.043	.058			.005	—	—			15°
314	63.15	16.29	1.76	2.40	1.87	3.61	2.46	5.96	2.28		0.30	trace	trace	SO ₃ 0.11 Cl 0.11 X 0.47 Li ₂ O trace	100.77	2.615
A2. II	1.053	.160	.011	.033	.047	.064	.040	.063			.004	—	—			15°
315	64.57	16.80	0.97	3.02	1.69	3.53	3.81	4.01	1.28						99.68	2.542
A3. III	1.076	.165	.006	.042	.042	.063	.061	.042								
316	72.30	13.96	0.30	1.70	0.60	2.13	3.00	4.50	0.40		0.20				99.29	
VIII. IV	1.205	.137	.002	.024	.015	.038	.048	.048			.003					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
301	I.4.(1)2.3.	Q 29.40 hy 0.43 or 33.92 mt 0.70 ab 29.87 an 4.73	Banchi, Val Tremola, St. Gotthard, Switzerland.	P. Waindziok.	P. Waindziok, In. Diss. Zür., p. 42, 1906.	Aplite.	
302	I.(3)4.2.3.	Q 35.64 hy 1.10 or 22.80 mt 1.39 ab 27.25 il 0.61 an 8.90 hm 1.28 C 0.20	Gemsboden, St. Gotthard, Switzerland.	P. Waindziok.	P. Waindziok, In. Diss. Zür., p. 21, 1906.	Granite gneiss.	
303	I.4.2.3.⊙	Q 21.30 di 1.50 or 30.58 hy 2.39 ab 29.34 mt 0.93 an 12.51 il 0.46	Santa Maria, St. Gotthard, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite.	
304	I(II).4.2.3(4).	Q 16.56 di 4.83 or 25.02 hy 4.98 ab 35.63 mt 1.62 an 9.17 il 0.61	Albula Tunnel, Lower Engadine, Switzerland.	O. Züst.	O. Züst. In. Diss. Zür., p. 15, 1905.	Granite.	Also in U. Gruben- mann, Btr. G. Kt. Schw., XXIII, p. 201, 1909.
305	I.4.2.(2)3.	Q 26.52 hy 2.60 or 36.14 mt 2.09 ab 21.48 il 0.61 an 7.51 hm 0.64 C 0.41	St. Stephan, Rofna, Switzerland.	G. Rüttschli.	G. Rüttschli, In. Diss. Zür., p. 31, 1903.	Granite porphyry.	
306	I''4.(1)2.3(4).	Q 21.18 di 4.58 or 25.58 hy 0.30 ab 38.25 mt 3.25 an 5.28 il 0.46	Platta Cotschna, Bundner Ober- land, Switzerland.	J. R. Hanhart.	A. Bodmer-Beder, N. J. B. B., XI, p. 239, 1897.	Quartz porphyry.	In W. T., p. 171.
307	I.4.(1)2.3(4).	Q 29.28- or 24.46 ab 38.25 an 5.84 C 1.12	Posto di Cavoli, S. Piero in Campo, Elba.	G. d'Achiardi.	G. d'Archiardi, Mem. Soc. Tosc. Sc. Nat., XIX, p. 118, 1903.	Aplite.	
308	I''4.2.3(4).	Q 19.38 hy 7.20 or 23.35 mt 1.62 ab 35.11 ap 0.34 an 11.95 C 1.12	Monte Capanne, Elba.	E. Manasse.	E. Manasse, Mem. Soc. Tosc. Sc. Nat., XXVIII, p. 184, 1912.	Granite.	
309	I''4.2(3).3.	Q 18.72 hy 7.45 or 30.02 mt 1.39 ab 25.15 an 15.01 C 0.51	Monte Amiata, Tuscany, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVIII, 1888.	Trachyte.	In W. T., p. 171.
310	I(II).4.2''.'3.	Q 18.54 hy 7.50 or 33.36 mt 1.39 ab 22.01 il 1.08 an 14.73	Vivo, Monte Amiata, Tuscany, Italy.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 408, 1887.	Trachyte.	In W. T., p. 171.
311	I(II).4.2.(2)3.	Q 18.36 di 1.83 or 33.92 hy 5.15 ab 23.06 mt 1.86 an 12.51 il 0.76	Abbadia S. Salva- tore, Monte Amiata, Tuscany, Italy.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 411, 1887.	Trachyte.	In W. T., p. 171.
312	I''4.2''.'3.	Q 17.22 hy 5.21 or 32.25 mt 0.93 ab 23.58 il 0.76 an 14.18	Fosso del Prato, Monte Amiata, Tuscany, Italy.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 410, 1887.	Trachyte.	In W. T., p. 171.
313	I(II).4.2(3).''3.	Q 17.10 hy 8.10 or 32.25 mt 1.16 ab 22.53 il 0.76 an 16.12 C 0.31	Poggio Traburzo- lo, Monte Amiata, Tuscany, Italy.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 412, 1887.	Trachyte.	In W. T., p. 171.
314	I(II).''4.2(3).(2)3.	Q 14.82 di 1.57 or 35.03 hy 6.51 ab 20.96 mt 2.55 an 15.85 il 0.61	La Crocina, Monte Amiata, Tuscany, Italy.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 413, 1887.	Trachyte.	In W. T., p. 171.
315	I(II).4''2(3).3''.	Q 15.38 di 0.22 or 23.35 hy 8.81 ab 31.96 mt 1.29 an 17.24	Monte San Vito, Bracciano Latium, Italy.	H. S. Washing- ton.	H. S. Washington, J. G., V, p. 362, 1897.	Toscanite.	In W. T., p. 171.
316	I''4.2.3.	Q 31.14 hy 4.01 or 29.69 mt 0.46 ab 25.15 il 0.46 an 10.56 C 0.31	Ingortosu, Sardinia.	C. Riva.	C. Riva, Att. Ac. Sc. Nap., (2), XII, No. 9, p. 28, 1905.	Granitite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
317	72.05	13.07	2.93	0.39	0.66	1.30	3.49	4.55	0.59	0.24	0.40	0.22	0.04	CO ₂ none ZrO ₂ 0.05 SO ₃ 0.18 BaO 0.06	100.22	
A1. I	1.201	.128	.018	.006	.017	.023	.056	.049			.005	.002	—			
318	71.88	14.90	0.60	1.30	0.93	2.34	3.20	4.55	0.40		0.27				100.37	
A3. III	1.198	.146	.004	.018	.023	.042	.052	.049			.003					
319	70.10	15.77	1.16	n. d.	0.39	2.25	4.21	4.08	1.79		0.10				99.85	
A4. IV	1.168	.155	.007	(.014)	.010	.040	.068	.044			.001					
320	70.03	13.56	3.20	0.89	none	1.43	3.69	4.16	3.04		0.34				100.34	
A3. III	1.167	.133	.020	.013	—	.025	.060	.045			.004					
321	69.36	15.93	1.49	0.40	0.27	3.05	3.18	4.29	0.79		0.54		trace		99.30	
A3. III	1.156	.156	.009	.006	.007	.055	.052	.046			.007				(100.30)	
322	67.78	16.51	1.86	0.52	0.76	2.55	3.37	3.82	2.40		0.43		0.22		100.22	
A2. II	1.130	.162	.012	.007	.019	.046	.055	.040			.005		.003			
323	63.44	17.03	1.97	1.61	0.87	2.78	3.53	5.31	3.31		0.75		0.21		100.81	
A2. II	1.057	.167	.012	.022	.022	.050	.056	.056			.009		.093			
324	62.28	20.30	2.34	0.88	0.35	1.95	4.29	4.95	1.77		0.31		0.21		99.63	
A2. II	1.038	.199	.015	.012	.009	.035	.069	.053			.004		.003			
325	66.61	16.18	0.36	3.75	1.63	1.97	4.15	5.45	n. d.		0.41	0.12			100.53	
A2. II	1.109	.159	.002	.052	.041	.036	.067	.058			.005	.001				
326	66.20	16.18	0.10	3.75	1.28	2.12	3.74	5.15	0.63		0.38	0.12			99.65	
A2. II	1.103	.159	.001	.052	.032	.038	.060	.055			.005	.001				
327	70.41	16.14	n. d.	1.19	0.87	2.47	2.70	5.64	1.28						100.70	
A4. IV	1.174	.158	—	.017	.022	.045	.044	.060								
328	65.49	18.95	2.55	1.36	0.60	2.06	3.45	5.08	0.71	0.37					100.62	
A3. III	1.092	.186	.016	.019	.015	.037	.056	.054								
329	75.76	14.36	0.86	n. d.	0.12	1.20	4.02	3.82	0.37						100.51	
A4. IV	1.263	.141	.005	(.010)	.003	.021	.064	.040								
330	73.20	13.40	1.76	n. d.	0.10	1.46	3.17	4.70	2.77						100.56	
A4. IV	1.220	.131	.011	(.022)	.003	.027	.051	.050								
331	72.74	12.70	1.91	n. d.	0.15	1.59	3.60	4.10	2.92						99.71	
A4. IV	1.212	.124	.012	(.024)	.004	.029	.058	.043								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODI POTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
317	I."4.(1)2.3.	Q 31.32 hy 1.70 or 27.24 mt 0.23 ab 29.34 il 0.76 an 4.45 hm 2.72 C 0.71 ap 0.67	Macomer, Sardinia.	H. S. Wash- ington.	H. S. Washington, XII, Cong. G. Int., C. R. 1913, p. 231.	Rhyolite.	
318	I.4.2.3.	Q 28.44 hy 3.75 or 27.24 mt 0.93 ab 27.25 il 0.46 an 11.58 C 0.31	Tempio Pausania, Sardinia.	C. Riva.	C. Riva, Att. Ac. Sc. Nap., (2), XII, No. 9, p. 27, 1905.	Granite.	
319	I.4.2.3(4).	Q 23.58 hy 2.72 or 24.46 il 0.15 ab 35.63 an 11.12 C 0.31	Monte di Cresia, San Antioco, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. Wiss., Anh. No. 2, p. 48, 1912.	Liparite.	Also in N. J. C. B., 1912, p. 738.
320	I."4.2.3".	Q 29.22 mt 2.09 or 25.02 il 0.61 ab 31.44 hm 1.76 an 6.95 C 0.31	Grotta Canargius, San Antioco, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. Wiss., Anh. No. 2, p. 48, 1912.	Liparite pitchstone.	Also in N. J. C. B., 1912, p. 738.
321	I.4.2(3).3.	Q 27.06 hy 0.70 or 25.58 il 0.91 ab 27.25 hm 1.49 an 15.29 tn 0.14 C 0.31	Fonte Sa Teula, Ittiri, Sardinia.	F. Millosevich.	F. Millosevich, Mem. Ac. Linc. (5), VIII, No. 15, p. 610, 1911.	Trachyda- cite.	
322	I.4.2".3".	Q 26.94 hy 1.90 or 22.24 mt 1.16 ab 28.82 il 0.76 an 12.79 hm 1.12 C 2.14	Monte Casellone, n. Ittiri, Sardinia.	F. Millosevich.	F. Millosevich, Mem. Ac. Linc. (5), VIII, No. 15, p. 613, 1911.	Trachyda- cite.	
323	I'"4".2.3.	Q 15.54 hy 2.73 or 31.14 mt 2.78 ab 29.34 il 1.37 an 13.90 C 0.51	Fonte Corbu, n. Caniga, Alghero, Sardinia.	F. Millosevich.	F. Millosevich, Mem. Ac. Linc. (5), VI, No. 14, p. 412, 1908.	Trachyandes- ite.	Also in Rend. Ac. Linc., XVI, p. 554, 1907.
324	I.4".2.3".	Q 13.62 hy 0.90 or 29.47 mt 2.55 ab 36.15 il 0.61 an 9.73 hm 0.64 C 4.28	Nuraghe Sa Patada, n. Sassari, Sardinia.	F. Millosevich.	F. Millosevich, Mem. Ac. Linc. (5), VI, No. 14, p. 424, 1908.	Trachyandes- ite.	
325	I(II).4(5).2.3.	Q 12.42 hy 10.04 or 22.25 mt 0.46 ab 35.11 il 0.76 an 9.17 ap 0.34 C 0.10	Eruption 1888-89, Vulcano, Aeolian Islands.	Pisani.	A. Lacroix, C. R., CXLVII. p. 1453, 1908.	Trachyte.	
326	I(II).4".2.3.	Q 15.90 hy 9.27 or 30.58 mt 0.23 ab 31.44 il 0.76 an 9.73 ap 0.34 C 0.92	Eruption 1888-89, Vulcano, Aeolian Islands.	Pisani.	A. Lacroix, C. R., CXLVII. p. 1453, 1908.	Trachyte.	Bomb.
327	I.4.2"/.3.	Q 25.26 hy 4.44 or 33.36 ab 23.06 an 12.51 C 0.92	Dych-Ssu Glacier, Central Caucasus.	Loewinson- Lessing.	Loewinson-Lessing, Vh. Russ. Min. Ges., XLII, p. 270, 1905.	Granite.	
328	I.4.2.3○	Q 20.40 hy 1.90 or 30.02 mt 3.71 ab 29.34 an 10.29 C 3.98	Gochasa River, Karabagh, Armenia.	Not stated.	A. S. Ginsberg, Ann. Inst. Poly. St. Pet., XX, p. 58, 1913.	Quartz trachyte.	
329	I.(3)4."/2.3(4).	Q 35.04 hy 1.62 or 22.24 ab 33.54 an 5.83 C 1.63	Sidi Zerzor, n. Ménerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, M. Soc. Ph. Gen., XXXIII, p. 115, 1900.	Liparite.	In W. T., p. 171.
330	I."4.2.3.	Q 32.10 hy 3.20 or 27.80 ab 28.72 an 7.51 C 0.31	Cap Marsa, n. Ménerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, M. Soc. Ph. Gen., XXXIII, p. 77, 1900.	Liparite.	In W. T., p. 171.
331	I."4."/2.3".	Q 31.56 di 1.46 or 23.91 hy 2.81 ab 30.39 an 6.39	Cap Marsa, n. Ménerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, M. Soc. Ph. Gen., XXXIII, p. 77, 1900.	Liparite.	In W. T., p. 173.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
332	72.13	13.28	1.38	n. d.	0.40	1.05	3.60	3.58	4.75						100.17	
A4. IV	1.202	.130	.009	(.018)	.010	.019	.058	.038								
333	72.90	16.70	0.36	n. d.	0.66	1.10	3.66	3.82	0.33						99.53	
A3. III	1.215	.164	.002	(.004)	.016	.020	.059	.040								
334	73.05	14.67	0.89	n. d.	0.26	0.97	3.99	5.11	0.91						99.85	2.211
A4. IV	1.218	.144	.006	(.012)	.007	.018	.064	.055								
335	71.80	14.90	1.10	1.08	0.39	2.20	4.17	4.11	0.60		0.26				100.61	
A3. III	1.197	.146	.007	.015	.010	.039	.068	.044			.003					
336	67.03	14.25	1.96	1.70	trace	1.05	3.85	3.90	5.73				trace		99.47	2.376
A3. III	1.117	.140	.013	.024	—	.019	.062	.041					—			
337	73.38	13.67	1.18	n. d.	0.09	1.17	2.99	6.47	0.67		0.02	0.16	trace	ZrO ₂ trace Cl 0.02 F none S 0.37 Cr ₂ O ₃ none Cu 0.02 Pb 0.05	100.26	
A2. II	1.223	.134	.008	(.016)	.002	.021	.048	.069			—	.001	—			
338	71.45	12.97	1.98	0.53	0.44	1.51	3.81	3.53	0.89	1.74	0.47	0.29			99.61	
A2. II	1.191	.127	.013	.007	.011	.027	.061	.037			.006	.002				
339	69.13	12.90	1.54	4.00	0.45	2.86	3.34	3.76	0.41	0.18	1.06	0.21			99.84	
A2. II	1.152	.126	.010	.056	.011	.051	.054	.040			.013	.002				
340	68.34	16.91	1.89	0.25	0.44	1.71	4.65	5.01	n. d.	0.06	0.56	0.17			99.99	
A2. II	1.139	.166	.012	.004	.011	.030	.075	.053			.007	.001				
341	63.69	16.59	1.05	3.29	0.54	2.34	3.81	5.97	1.75	0.24	0.70	0.23			100.20	
A2. II	1.062	.163	.007	.046	.014	.042	.061	.064			.009	.002				
342	72.05	12.79	3.57	0.83	0.47	1.98	2.60	4.46	0.95						99.70	
A3. III	1.201	.125	.023	.011	.012	.036	.042	.048								
343	68.94	11.60	2.01	2.67	0.59	2.40	2.41	4.31	4.95						99.88	
A3. III	1.149	.114	.013	.038	.015	.043	.039	.045								
344	66.40	12.91	3.87	2.56	0.53	2.32	3.30	3.09	3.16	1.09	0.54	0.16	0.09		100.02	
A2. II	1.107	.127	.024	.036	.013	.041	.053	.033			.007	.001	.001			
345	74.20	13.90	0.88	1.25	0.26	1.50	2.49	5.66	0.36		trace				100.50	
A3. III	1.237	.136	.006	.018	.007	.027	.040	.061			—					
346	71.95	14.90	2.32	0.54	0.58	0.87	3.65	4.10	0.93						99.84	
A3. III	1.199	.146	.014	.008	.015	.016	.059	.044								
347	69.90	15.43	0.51	3.22	0.54	1.79	2.51	6.10	0.20		0.35				100.55	
A3. III	1.165	.151	.003	.044	.014	.032	.040	.065			.004					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
332	I.(3)4."2.3(4).	Q 33.60 hy 3.38 or 21.13 ab 30.39 an 5.28 C 1.53	Cap Marsa, n. Ménerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, M. Soc. Ph. Gen., XXXIII, p. 77, 1900.	Liparite.	In W. T., p. 173.
333	I.(3)4."2.3(4).	Q 33.66 hy 2.13 or 22.24 ab 30.92 an 5.56 C 4.59	Filfila, n. Philippeville, Algeria.	P. Termier	P. Termier, C. R., CXXXIV, p. 373, 1902.	Aplite.	
334	I.4.(1)2.3.	Q 26.94 hy 2.28 or 30.58 ab 33.54 an 5.00 C 0.71	Teneriffe, Canary Islands.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 440, 1887.	Obsidian.	In W. T., p. 173.
335	I.4.2.3(4).	Q 26.22 di 1.14 or 24.46 hy 1.10 ab 35.63 mt 1.62 an 9.45 il 0.46	Mount Gbon, Ivory Coast.	Pisani.	A. Lacroix, Nouv. Arch. Mus., III, p. 118, 1911.	Granite.	
336	I.4."2.3(4).	Q 27.00 hy 1.45 or 22.80 mt 3.02 ab 32.49 an 5.28 C 1.84	Amba Barra, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 270, 1900.	Pitchstone.	In W. T., p. 173.
337	I.4.(1)2."3.	Q 28.14 hy 2.31 or 38.36 ap 0.34 ab 25.15 an 4.73	Adadle, Somaliland, East Africa.	Not stated.	A. Bodmer-Beder, Vierteljt. Nf. Ges. Zür., XXXIX, p. 196, 1894.	Granite.	In W. T., p. 173.
338	I.(3)4."2.3(4).	Q 33.12 hy 1.10 or 20.57 mt 0.23 ab 31.96 il 0.91 an 5.56 hm 1.92 C 0.92 ap 0.67	Ampisarakissa, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 176, 1913.	Rhyolite.	
339	I(II)."4.2.3".	Q 28.08 di 2.88 or 22.24 hy 3.97 ab 28.30 mt 2.32 an 8.90 il 1.98 ap 0.67	Andromasy, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Olivine rhyolite.	
340	I.4.2.3".	Q 18.36 hy 1.10 or 29.47 il 0.61 ab 39.30 hm 1.89 an 7.51 ru 0.24 C 1.12 ap 0.34	Sahatsio, n. Antsirabé, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 176, 1913.	Trachyte.	
341	I"4(5).2.3.	Q 11.88 hy 5.36 or 35.58 mt 1.62 ab 31.96 il 1.37 an 9.73 ap 0.67 C 0.31	Madagascar.	Boiteau?	A. Lacroix, pers. com.	Not named.	
342	I.(3)4.2.3.	Q 34.68 di 0.22 or 26.69 hy 1.10 ab 22.01 mt 2.55 an 9.73 hm 1.92	Manzinyama River, Lebombo Moun- tains, Swaziland.	R. Reinisch.	J. M. Henderson, Tr. G. Soc. S. Afr., XII, p. 29, 1910.	Rhyolite.	
343	I(II).(3)4.2.3.	Q 31.92 di 2.87 or 25.02 hy 3.24 ab 20.44 mt 3.02 an 8.34	Lebombo Moun- tains, Swaziland.	R. Reinisch.	J. M. Henderson, Tr. G. Soc. S. Afr., XII, p. 28, 1910.	Pitchstone.	
344	I(II).(3)4.2"(3)4).	Q 29.76 hy 2.09 or 18.35 mt 5.57 ab 27.77 il 1.06 an 10.56 ap 0.34 C 0.31	Indulawane Hill, Zululand.	G. T. Prior.	G. T. Prior, Ann. Natal Mus., II, No. 2, p. 155, 1910.	Toscanite.	
345	I.(3)4.2.(2)3.	Q 33.48 hy 2.28 or 33.92 mt 1.39 ab 20.96 an 7.51 C 0.82	Tatarka River, Jenissei District, Siberia.	Not stated.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 134, 1910.	Granite.	
346	I.(3)4.(1)2.3".	Q 32.04 hy 1.50 or 24.46 mt 1.86 ab 30.92 hm 0.91 an 4.45 C 2.75	Angara River, Jenissei District, Siberia.	Not stated.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 269, 1910.	Orthogneiss.	
347	I"4.2.(2)3.	Q 25.20 hy 6.28 or 36.14 mt 0.70 ab 20.96 il 0.61 an 8.80 C 1.43	Jenissei River, Jenissei District, Siberia.	Not stated.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 269, 1910.	Orthogneiss.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
348	65.63	16.20	0.31	3.25	1.13	3.44	3.67	4.23	1.12	0.09	0.40			CO ₂ 0.36	99.83	
A3. III	1.094	.159	.002	.045	.028	.062	.080	.045			.005					
349	71.83	14.83	0.84	1.39	0.23	1.44	3.99	4.50	0.13		trace		none	CO ₂ 0.46	99.63	2.58
A3. III	1.197	.145	.005	.019	.006	.026	.065	.048			—		—			
350	72.96	14.57	n. d.	1.62	0.52	1.47	4.59	4.26	0.37			0.07	trace		100.43	
A4. IV	1.216	.143	—	.022	.013	.027	.074	.046				—	—			
351	72.88	14.62	0.43	1.69	0.35	1.51	3.68	4.05	0.65			0.06	0.09		100.01	
A2. II	1.215	.143	.003	.024	.009	.027	.060	.043				—	.001			
352	67.99	14.96	0.40	2.35	trace	1.98	2.79	4.98	4.37						99.82	
A3. III	1.133	.147	.003	.033	—	.036	.045	.053								
353	62.72	12.96	4.67	3.22	0.30	1.87	3.26	5.41	4.43		0.65	0.23	0.03		99.75	
A2. II	1.045	.127	.029	.044	.008	.034	.053	.057			.008	.002	—			
354	74.87	12.88	1.34	1.53	0.15	1.44	3.29	4.16	0.29		0.27		trace		100.22	
A3. III	1.248	.126	.008	.021	.004	.026	.053	.045			.003		—			
355	73.24	12.87	1.01	2.21	0.44	1.56	3.77	4.48	0.40				0.05		100.03	2.646
A3. III	1.221	.126	.006	.031	.011	.028	.061	.048					—			
356	71.25	14.21	0.85	0.43	0.89	2.72	3.11	6.74	0.48						100.68	
A3. III	1.188	.139	.005	.006	.022	.048	.050	.071								
357	69.50	14.52	0.91	3.07	1.66	2.03	3.10	4.48	1.02		0.15	0.22			100.66	
A2. II	1.158	.142	.006	.043	.042	.036	.050	.048			.002	.002				
358	67.75	15.51	2.26	1.22	0.91	2.79	3.22	3.15	2.29	0.45	0.32	trace			99.87	
A3. III	1.129	.152	.014	.017	.023	.050	.052	.034			.004	—				
359	76.48	13.94	trace	none	0.01	1.08	3.70	4.90	0.86						100.97	2.611
B3. IV	1.275	.137	—	—	—	.020	.060	.052								
360	74.00	14.49	1.10	0.45	0.44	0.92	3.29	4.85	0.56	0.18	0.14	0.05	0.08	CO ₂ none ZrO ₂ none SO ₂ none Cl none F none S none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.06 SrO trace Li ₂ O none	100.61	2.630
A1. I	1.233	.142	.007	.007	.011	.016	.053	.052			.002	—	.001			
361	73.98	13.47	0.72	0.97	0.36	0.90	3.39	4.88	0.32	0.12	0.54	0.05	0.03	CO ₂ 0.01 ZrO ₂ 0.02 SO ₂ none Cl 0.02 F 0.02 S none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO trace SrO trace Li ₂ O none	99.83	2.639
A1. I	1.233	.132	.005	.014	.009	.016	.055	.052			.007	—	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
348	I(II).4.2''3.	Q 16.92 di 1.89 or 25.02 hy 6.86 ab 31.44 mt 0.46 an 15.01 il 0.76	Riasanov Trail, Jenissei District, Siberia.	G. Zhukovsky.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 234, 1910.	Banatite.	
349	I.4.''2.3''.	Q 26.82 hy 2.45 or 26.69 mt 1.16 ab 34.06 an 7.23 C 0.61	Zeia River, Amur District, Siberia.	W. Abramov.	E. Ahnert, Expl. G. Reg. Aurif. Sib., X, Tab. VII, 1910.	Quartz porphyry.	
350	I.4.''2.3(4).	Q 24.66 di 0.92 or 25.58 hy 3.75 ab 38.77 an 6.39	Konyam Bay, Siberia.	G. Lindström.	G. Lindström, Ref. N. J., 1885, I, p. 430.	Granite.	In W. T., p. 173.
351	I.''4.2.3''.	Q 30.72 hy 3.80 or 23.91 mt 0.70 ab 31.44 an 7.51 C 1.33	Konyam Bay, Siberia.	G. Lindström.	G. Lindström, Ref. N. J., 1885, I, p. 430.	Granite.	In W. T., p. 173.
352	I.4.2.3.⊙	Q 26.58 hy 3.96 or 29.47 mt 0.70 ab 23.58 an 10.01 C 1.33	Jozankei, Ishikari, Hokkaido, Japan.	Takaminé.	B. G. Soc. Jap., 1884.	Liparite.	S. Kozu, pers. com.
353	I(II).4.(1)2.3.	Q 19.56 di 2.32 or 31.69 hy 0.56 ab 27.77 mt 6.73 an 4.73 il 1.22 ap 0.67	Nakamura, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sci. Rep. Tohok. Un., (2), I, p. 40, 1913.	Rhyolite.	
354	I.(3)4.2.3.	Q 35.64 hy 1.72 or 25.02 mt 1.86 ab 27.77 il 0.46 an 7.23 C 0.20	Tondano, Menado District, Celebes.	Ledeboer.	R. D. M. Verbeek, Jb. Mijnw. XXXVII, p. 91, 1908.	Obsidian.	
355	I.''4.(1)2.3.	Q 29.16 di 2.64 or 26.69 hy 3.04 ab 31.96 mt 1.39 an 4.73	Koeantan, Sumatra.	L. Serrurier.	R. D. M. Verbeek, Sum. Westk., p. 232, 1883.	Granitite.	Not in W. T.
356	I.''4.(1)2.''3.	Q 22.44 di 4.75 or 39.43 wo 0.93 ab 26.20 mt 1.16 an 5.00	Lau Biang, Battak Plateau, Sumatra.	W. Herz.	L. Milch, Z. D. G. G., LI, p. 69, 1899.	Liparite.	In W. T., p. 173.
357	I(II).4.2.3.	Q 26.10 hy 8.82 or 26.69 mt 1.39 ab 26.20 il 0.30 an 8.06 C 1.53	Lau Alas, Sumatra.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 48, 1909.	Granite.	
358	I.''4.2(3).3(4).	Q 29.40 hy 2.30 or 18.90 mt 3.02 ab 27.25 il 0.61 an 13.90 hm 0.16 C 1.63	Lai Hrunum, Pakpak Land, Sumatra.	M. Dittrich.	H. Stegmann, N. J. B. B., XXXVII, p. 436, 1909.	Quartz trachyte- andesite.	
359	I.''4.(1)2.3.	Q 33.48 or 28.91 ab 31.44 an 5.56 C 0.41	Orr's Gulley, Dargo, Victoria.	A. Howitt.	A. Howitt, Ref. N. J., 1889, I, p. 121.	Aplite.	In W. T., p. 173.
360	I.(3)4.(1)2.3.	Q 33.60 hy 1.10 or 28.91 mt 1.39 ab 27.77 il 0.30 an 4.45 hm 0.16 C 2.14	Tenterfield, New England, New South Wales.	J. C. H. Min- gay.	E. C. Andrews, Rec. G. S. N. S. W., VIII, (3), p. 225, 1907.	Aplitic granite.	
361	I.(3)4.(1)2.3.	Q 32.88 hy 1.16 or 28.91 mt 1.16 ab 28.82 il 1.06 an 4.45 C 0.92	Bolivia, New England, New South Wales.	J. C. H. Min- gay.	E. C. Andrews, Rec. G. S. N. S. W., VIII, (3), p. 220, 1907.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
362	70.71	11.91	0.33	2.43	0.89	1.88	3.29	4.07	0.48	0.32	0.37	0.04	0.13	CO ₂ 0.05 ZrO ₂ none SO ₃ 0.11 Cl none F none S none Cr ₂ O ₃ none V ₂ O ₅ trace NiO none BaO 0.12 SrO trace Sb ₂ O ₃ 0.03	100.39	2.678
A1. I	1.179	.146	.002	.033	.022	.034	.053	.044			.005	—	.002			
363	69.55	14.16	0.60	3.33	1.45	2.20	3.14	4.09	0.30	0.20	0.54	0.12	0.23	CO ₂ 0.01 ZrO ₂ none SO ₃ 0.11 Cl none F none S none Cr ₂ O ₃ trace V ₂ O ₅ none NiO none BaO 0.07 SrO trace CuO trace	100.13	2.658
A1. I	1.159	.139	.004	.046	.036	.039	.051	.044			.007	.001	.003			
364	69.14	14.74	0.70	1.98	1.58	3.14	3.36	4.13	0.38	0.18	0.36	0.18	trace	CO ₂ 0.23 ZrO ₂ none Cl 0.01 Cr ₂ O ₃ none V ₂ O ₅ none NiO trace BaO 0.02 SrO trace Li ₂ O trace	100.15	2.696
A1. I	1.152	.145	.004	.028	.040	.036	.054	.043			.005	.001	—			
365	67.61	15.66	1.12	3.31	1.55	2.14	3.03	3.58	0.90	0.30	0.62	0.13	0.12	CO ₂ none ZrO ₂ trace SO ₃ 0.12 Cl 0.02 Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.06 SrO trace Li ₂ O none Sb ₂ O ₃ trace	100.30	2.722
A1. I	1.127	.154	.007	.046	.039	.038	.048	.038			.008	.001	.002			
366	73.33	12.43	0.10	2.43	0.59	0.98	2.71	5.66	1.41	0.09	0.23	0.11	trace	CO ₂ trace ZrO ₂ none SO ₃ none Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.06 SrO none	100.13	2.648
A1. I	1.222	.122	.001	.033	.015	.018	.044	.060			.003	.001	—			
367	71.92	13.83	1.00	1.62	0.54	1.28	2.67	5.61	0.95	0.11	0.28	0.09	0.02	CO ₂ 0.35 ZrO ₂ none Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ none NiO trace BaO 0.05 SrO none	100.32	2.643
A1. I	1.199	.136	.006	.022	.014	.023	.044	.060			.004	—	—			
368	71.27	13.40	1.11	1.89	0.79	2.46	3.08	4.91	0.32	0.18	0.24	0.10	0.07	CO ₂ 0.03 ZrO ₂ none SO ₃ none Cl 0.06 S none Cr ₂ O ₃ none NiO 0.01 BaO none SrO trace	99.92	2.687
A1. I	1.188	.131	.007	.026	.020	.044	.050	.052			.003	.001	.001			
369	69.31	13.48	0.85	3.64	1.41	1.75	2.91	4.30	0.88	0.15	0.70	0.24	0.07	CO ₂ 0.02 S none V ₂ O ₅ none BaO 0.07	99.78	2.708
A1. I	1.155	.132	.005	.051	.035	.031	.047	.046			.009	.002	.001			
370	68.25	14.41	2.00	2.07	1.08	3.06	3.19	4.74	0.35	0.19	0.36	0.15	0.16	CO ₂ 0.05 ZrO ₂ none SO ₃ none Cl none F none S none Cr ₂ O ₃ none NiO none BaO 0.03 SrO trace CuO 0.01	100.10	2.698
A1. I	1.138	.141	.013	.029	.027	.055	.052	.050			.005	.001	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
362	I''4.2.3.	Q 28.74 hy 5.90 or 24.46 mt 0.46 ab 27.77 il 0.76 an 9.45 C 1.53	Hillgrove, New England, New South Wales.	J. C. H. Min- gay.	E. C. Andrews, Rec. G. S. N. S. W., VIII, (3), p. 218, 1907.	Granite.	
363	I(II).4.2.3.	Q 26.58 hy 8.62 or 24.46 mt 0.93 ab 26.72 il 1.06 an 10.01 ap 0.34 C 0.82	Hillgrove, New England, New South Wales.	J. C. H. Min- gay.	E. C. Andrews, Rec. G. S. N. S. W., VIII, (3), p. 215, 1907.	Granite.	
364	I''4.2''3.	Q 24.60 di 1.14 or 23.91 hy 5.94 ab 28.30 mt 0.93 an 13.34 il 0.76 ap 0.34	Walcha Road, New England, New South Wales.	W. A. Greig.	E. C. Andrews, Rec. G. S. N. S. W., VIII, (3), p. 211, 1907.	Granite porphyry.	
365	I(II)''4.2.3.	Q 28.14 hy 8.26 or 21.13 mt 1.62 ab 25.15 il 1.22 an 9.73 ap 0.34 C 3.37	Trimm's Tunnel, New England, New South Wales.	J. C. H. Min- gay.	E. C. Andrews, Rec. G. S. N. S. W., VIII, (3), p. 217, 1907.	Granite.	
366	I''4''(1)2''3.	Q 31.26 hy 5.13 or 33.36 mt 0.23 ab 23.06 il 0.46 an 4.17 ap 0.34 C 0.31	Canbelego, New South Wales.	H. P. White.	G. W. Card, pers. com.	Rhyolite.	
367	I''4''2''3.	Q 30.18 hy 2.98 or 33.56 mt 1.39 ab 23.06 il 0.61 an 6.39 C 0.92	Overflow station, New South Wales.	W. A. Greig.	G. W. Card, pers. com.	Rhyolite.	
368	I''4.2.3.	Q 28.14 di 2.78 or 28.91 hy 2.85 ab 26.20 mt 1.62 an 5.06 il 0.46 ap 0.34	Tingha, New South Wales.	H. P. White.	J. E. Carne, G. S. N. S. W., Min. Res., No. 14, p. 64, 1911.	Granite.	
369	I(II)''4.2.3.	Q 28.56 hy 8.52 or 25.58 mt 1.16 ab 24.63 il 1.37 an 6.67 ap 0.67 C 1.53	Enmore Home- stead, Uralla, New South Wales.	W. G. Stone.	N. S. W. Dep. Min., A. R. (1913), p. 191, 1914.	Granite.	
370	I(II).4.2.3.	Q 23.70 di 2.94 or 27.80 hy 2.99 ab 27.25 mt 3.02 an 10.84 il 0.76 ap 0.34	Herding Yard Creek, New South Wales.	W. A. Greig.	J. E. Carne, G. S. N. S. W., Min. Res. No. 14, p. 90, 1911.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
371	69.90	14.09	0.88	2.33	0.98	1.10	2.35	5.99	1.00	0.10	0.40	0.19	0.02	CO ₂ 0.40 ZrO ₂ none Cl 0.03 F none FeS ₂ 0.02 Cr ₂ O ₃ none NiO none BaO 0.02 SrO trace Li ₂ O trace CuO 0.01	99.81	2.649
A1. I	1.165	.138	.006	.032	.025	.020	.038	.063			.005	.001	—			
372	72.72	12.76	none	3.45	0.10	1.23	2.89	4.75	1.01		0.25	0.22	0.25	CO ₂ 0.02	99.72	
A2. II	1.212	.125	—	.048	.003	.021	.047	.051			.003	.002	.004			
373	69.93	15.28	2.96	0.65	0.40	2.30	3.26	3.20	0.97	0.70	0.33	0.21	0.03	CO ₂ none	100.22	
A2. II	1.166	.150	.019	.009	.010	.041	.053	.034			.004	.001	—			
374	67.15	15.03	1.86	1.73	0.33	2.85	3.00	3.34	3.85	0.47	0.30	0.16	0.05	CO ₂ none	100.12	
A2. II	1.119	.147	.012	.024	.008	.051	.048	.035			.004	.001	—			
375	70.36	14.30	2.40	1.88	0.58	1.10	2.59	5.00	0.88	0.33	0.30	0.40	0.03		100.15	
A2. II	1.173	.140	.015	.026	.015	.020	.042	.053			.004	.003	—			
376	69.40	15.27	1.48	1.81	1.16	2.00	3.39	3.49	1.10	0.15	0.44	0.24	0.05	CO ₂ none	99.98	
A2. II	1.157	.150	.009	.025	.029	.036	.055	.037			.006	.002	—			
377	67.90	14.77	2.36	2.34	1.32	2.20	3.33	3.25	0.10	1.39	0.53	0.32	0.07	CO ₂ 0.20	100.08	
A2. II	1.132	.145	.015	.032	.033	.039	.053	.035			.007	.002	.001			
378	68.50	14.35	1.60	3.71	0.93	2.11	2.91	3.83	1.05	0.11	0.80	0.29	0.05	SO ₂ 0.14	100.38	
A2. II	1.142	.141	.010	.051	.023	.038	.047	.040			.010	.002	—			
379	68.50	14.29	1.80	1.23	0.88	2.78	3.12	2.92	3.74	0.30	0.34	0.28	0.05		100.23	
A2. II	1.142	.140	.011	.017	.022	.050	.050	.031			.004	.002	—			
380	73.55	13.70	0.24	2.36	0.26	0.92	3.59	4.46	0.36	0.08	0.21		0.05	CO ₂ 0.04	99.82	
A2. II	1.223	.134	.002	.033	.007	.016	.058	.048			.003		—			
381	71.10	14.50	0.31	3.10	1.17	2.59	3.25	4.02	0.25		0.46	0.03			100.75	
A2. II	1.185	.142	.002	.043	.029	.046	.053	.043			.006	—				

RANG 2. DOMALKALIC. TOSCANASE.

1	69.06	15.26	0.68	2.53	0.34	2.83	4.83	2.87	0.16		0.74	0.14			99.49	2.685
A2. II	1.151	.150	.004	.035	.009	.050	.079	.031			.009	.001				
2	73.33	13.55	0.58	1.53	0.45	1.66	5.01	3.12	0.45		0.17		0.04		99.89	
A2. II	1.222	.133	.004	.021	.011	.030	.081	.033			.002		—			
3	70.00	16.00	1.28	0.51	0.50	2.30	5.34	2.99	0.52	0.07	0.20	0.05	0.08	S 0.05 Cr ₂ O ₃ none BaO 0.04 SrO 0.01	99.94	
A1. I	1.167	.157	.008	.007	.013	.041	.086	.032			.003	—	.001			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIPOTASSIC. TOSCANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
371	I''4.(1)2.(2)3.	Q 28.74 hy 5.27 or 35.03 mt 1.39 ab 19.91 il 0.76 an 4.73 ap 0.34 C 2.04	Cobar, New South Wales.	W. A. Greig.	E. C. Andrews, G. S. N. S. W., Min. Res. No. 17, p. 66, 1913.	Orthoclase porphyry.	
372	I''(3)4.(1)2.3.	Q 33.24 hy 6.77 or 28.36 il 0.46 ab 24.63 ap 0.67 an 3.89 C 1.33	Mount Rangitoto, Mikonui, New Zealand.	J. S. MacLaurin.	P. G. Morgan, N. Z. G. S. B. 6, p. 135, 1908.	Granite.	
373	I.(3)4.2.3(4).	Q 33.48 hy 1.00 or 18.90 mt 1.16 ab 27.77 il 0.61 an 10.56 hm 2.24 C 2.55 ap 0.34	Kopukairoa, Te Puke District, New Zealand.	Not stated.	J. A. Bartrum, N. Z. Min. Statem., (1912), p. 139, 1913.	Rhyolite.	
374	I.(3)4.2(3).3''.	Q 31.02 hy 1.86 or 19.46 mt 2.78 ab 25.15 il 0.61 an 13.34 ap 0.34 C 1.63	Kirikiri Creek, Te Puke District, New Zealand.	Not stated.	J. A. Bartrum, N. Z. Min. Statem., (1912), p. 140, 1913.	Rhyolite.	
375	I''(3)4.(1)2.3.	Q 33.66 hy 2.42 or 29.47 mt 3.48 ab 22.01 il 0.61 an 2.78 ap 1.01 C 3.57	Cape Foulwind, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Granite.	
376	I''(3)4.2.3(4).	Q 30.48 hy 4.22 or 20.57 mt 2.03 ab 28.52 il 0.91 an 8.06 ap 0.67 C 2.96	Waimangaroa River, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Quartz porphyry.	
377	I(II).(3)4.2.3''.	Q 29.76 hy 4.75 or 19.46 mt 3.48 ab 27.77 il 1.06 an 8.90 ap 0.67 C 2.55	Waimangaroa Valley, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Quartz porphyry.	
378	I(II).(3)4.2.3.	Q 30.24 hy 6.39 or 22.24 mt 2.32 ab 24.63 il 1.52 an 8.62 ap 0.67 C 2.35	Mabel Bay, Brighton, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Granite.	
379	I''(3)4.2(3).3.	Q 32.88 hy 2.46 or 17.24 mt 2.55 ab 26.20 il 0.61 an 11.95 ap 0.67 C 1.63	Aroha, Hauraki, New Zealand.	Surv. lab.	Henderson and Fraser, N. Z. G. S. B. 16, p. 67, 1913.	Dacite.	
380	I''4.(1)2.3.	Q 31.20 hy 4.40 or 26.69 mt 0.46 ab 30.39 il 0.46 an 4.45 C 1.21	Mount Larsen, Ross Region, Antarctica.	Burrows and Walkom.	J. W. E. David, pers. com.	Not named.	Erratic block.
381	I''4.2''3.	Q 27.18 hy 7.52 or 23.91 mt 0.46 ab 27.77 il 0.91 an 12.79	Wandel Island, Graham Land, Antarctica.	Pisani.	G. Gourdon, Exp. Ant. Fr., Petr. vol., p. 144, 1908.	Granite.	

SUBBRANG 4. DOSODIC. LASSENSE. (C. I. P. W., 1902.)

1	I''4.2.4.	Q 22.20 di 2.38 or 17.24 hy 2.58 ab 41.39 mt 0.93 an 11.12 il 1.37 ap 0.34	Siusasigsak, n. Jacobshavn, East Greenland.	A. Lindner.	M. Belowsky, Z. D. G. G., LVIII, p. 24, 1905.	Granite gneiss.	
2	I.4.(1)2.4.	Q 27.72 di 2.57 or 18.35 hy 1.92 ab 42.44 mt 0.93 an 5.28 il 0.30	Methuen Town- ship, Ontario.	M. F. Connor.	Adams and Barlow, Can. G. S., Mem. 6, p. 57, 1910.	Granite gneiss.	
3	I.4.2.4.⊙	Q 21.98 di 0.43 or 17.79 hy 1.10 ab 45.06 mt 0.66 an 10.84 il 0.46 hm 0.48	Rice Bay, Rainy Lake, Ontario.	M. F. Connor.	A. C. Lawson, Can. G. S., Mem. 40, p. 59, 1913.	Acid dike rock (aplite?).	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
4	68.48	12.70	2.41	4.50	0.74	1.41	3.72	3.36	1.13		0.61	0.20	0.05		99.31	2.673
B2. III	1.141	.125	.015	.063	.019	.025	.060	.036			.008	.001	—			
5	64.83	15.02	5.57	0.94	1.47	2.62	3.93	2.36	1.76		0.67		0.29	CO ₂ 0.55	100.02	
A2. II	1.081	.147	.035	.013	.037	.047	.063	.025			.008		.004			
6	69.76	18.22	0.25	1.59	0.40	2.68	4.06	2.06	0.50	0.15	0.36			CO ₂ none	100.02	
A3. III	1.163	.179	.002	.022	.010	.048	.066	.022			.005					
7	73.27	15.51	0.33	1.14	0.15	2.74	4.79	1.66	0.68		0.10	trace	trace		100.37	
A3. III	1.221	.152	.002	.016	.004	.049	.077	.018			.001	—	—			
8	71.34	13.97	1.95	1.00	0.62	1.63	4.83	3.89	0.80	0.09	0.43		trace		100.55	
A3. III	1.189	.137	.012	.014	.016	.029	.077	.041			.005		—			
9	70.64	15.34	1.83	1.10	0.52	1.24	5.23	3.55	0.38	0.14	0.90		trace		100.87	2.632
A3. III	1.177	.150	.011	.014	.013	.022	.084	.038			.011		—			
10	70.62	15.31	1.06	0.43	0.29	1.30	4.55	4.01	0.72	0.16	0.29	0.07		CO ₂ 0.88	99.69	Fresh?
A2. II	1.177	.150	.007	.006	.007	.023	.074	.042			.004	—				
11	73.32	15.01	0.47	1.19	0.15	1.35	4.27	3.72	0.13		0.06		trace		99.67	
A3. III	1.222	.147	.003	.017	.004	.024	.069	.039			.001		—			
12	72.41	13.85	1.13	1.57	0.45	1.54	4.31	3.68	0.41		0.44	0.07	0.33	ZrO ₂ trace Cl none F 0.01 S 0.05 Cr ₂ O ₃ none BaO 0.03	100.28	
A1. I	1.207	.136	.007	.022	.011	.028	.069	.039			.006	—	.005			
13	74.70	15.45	0.08	0.64	0.06	1.70	4.90	2.62	0.10		0.07	0.03	0.05	ZrO ₂ 0.04 SO ₃ 0.05 BaO 0.07	100.52	
A1. I	1.245	.151	.001	.009	.002	.030	.079	.028			.001	—	—			
14	68.60	14.72	4.29	1.41	0.38	1.46	4.82	3.52	0.16		0.60	0.16	0.04	ZrO ₂ 0.01 SO ₃ 0.18 NiO none BaO 0.18 Cu none Zn none	100.33	
A1. I	1.143	.144	.027	.019	.010	.026	.077	.037			.008	.001	—			
15	72.33	14.56	0.15	2.22	0.91	2.55	3.40	2.82	0.30					CO ₂ none	99.24	
B3. IV	1.206	.143	.001	.031	.023	.046	.055	.030								
16	70.90	15.25	1.52	1.53	0.63	2.40	4.32	2.85	0.17		0.42	trace	trace	SO ₃ trace	99.99	
A3. III	1.182	.150	.009	.021	.016	.043	.069	.031			.005	—	—			
17	68.90	15.75	1.16	1.49	0.74	2.66	4.76	3.49	0.18		0.36	trace	trace	SO ₃ trace	99.49	2.66
A3. III	1.148	.155	.007	.021	.019	.047	.077	.037			.005	—	—			
18	69.55	16.72	0.90	n. d.	0.27	1.69	5.88	3.94	0.27						99.31	2.658
B3. IV	1.159	.164	.006	(.012)	.007	.030	.095	.041								
19	69.36	17.23	1.43	n. d.	0.59	2.14	5.17	4.57	0.33						100.82	2.665
A4. IV	1.156	.169	.009	(.018)	.015	.038	.084	.049								18°

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
4	I(II).4.''2.(3)4.	Q 27.72 hy 7.18 or 20.02 mt 3.06 ab 31.44 il 1.22 an 6.12 ap 0.34 C 0.71	Onaping, Sudbury, Ontario.	E. G. R., Ardagh.	A. P. Coleman, J. G., XV, p. 770, 1907.	Syenite.	
5	I(II).4.2''4.	Q 25.32 hy 3.70 or 13.90 mt 2.09 ab 33.01 il 1.22 an 13.06 hm 4.16 C 1.22	Titus's mill, Upham, New Brunswick.	W. D. Matthew.	W. D. Matthew, Tr. N. Y. Ac. Sci., XIV, p. 207, 1895.	Granite.	In W. T., p. 173.
6	I.''4.(1)2.4.	Q 30.54 hy 3.64 or 12.23 mt 0.46 ab 34.58 an 13.34 C 4.69	Mount Piper, Belknap Moun- tains, New Hampshire.	H. S. Washing- ton.	Pirsson and Washing- ton, A. J. S., XXII, p. 446, 1906.	Adamellite aplite.	
7	I.''4.2''4.	Q 32.16 hy 2.12 or 10.01 mt 0.46 ab 40.35 il 0.15 an 13.62 C 0.82	Moore's quarry, Florence, Massa- chusetts.	L. G. Eakins.	B. K. Emerson, U. S. G. S. Mon. 32, p. 316, 1898.	Granite.	In W. T., p. 173.
8	I.4.(1)2.(3)4.	Q 25.02 di 2.16 or 22.80 hy 0.60 ab 40.35 mt 2.09 an 5.28 il 0.76 hm 0.48	Stony Brook, Neponset Valley, Massachusetts.	W. T. Hall.	F. Bascom, J. Ac. Nat. Sci. Phila., (2), XV, p. 135, 1912.	Granite.	
9	I.4.(1)2.''4.	Q 23.28 hy 1.30 or 21.13 mt 0.70 ab 44.02 il 0.67 an 6.12 hm 1.28 C 0.61	Marblehead Neck, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VII, p. 292, 1899.	Rhyolite.	In W. T., p. 173.
10	I.4.''2.(3)4.	Q 25.68 hy 0.70 or 23.35 mt 0.46 ab 38.77 il 0.61 an 6.39 hm 0.80 C 1.43 ap 0.34	Becket, Massa- chusetts.	G. Steiger.	B. K. Emerson, U. S. G. S. B. 228, p. 39, 1904.	Gneissoid granite.	
11	I.''4.''2.(3)4.	Q 30.54 hy 2.12 or 21.68 mt 0.70 ab 36.15 il 0.15 an 6.67 C 1.53	Mohegan Quarry, Peekskill, New York.	E. Waller.	G. S. Rogers, Ann. N. Y. Ac. Sci., XXI, p. 61, 1911.	Granite.	
12	I.4.2.(3)4.	Q 28.68 hy 2.95 or 21.68 mt 1.62 ab 36.15 il 0.61 an 7.78	Saratoga Springs, New York.	E. W. Morley.	H. P. Cushing, pers. com.	Granite gneiss.	
13	I.''4.2.4.	Q 32.04 hy 1.12 or 15.57 mt 0.23 ab 41.39 il 0.15 an 8.34 C 1.43	Cranberry Lake, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S., A. R. (1908), p. 74, 1909.	Granite gneiss.	
14	I.''4.''2.''4.	Q 24.18 hy 1.00 or 20.57 mt 2.55 ab 40.35 il 1.22 an 6.39 hm 2.56 C 0.71 ap 0.34	German Valley, Schooleys Moun- tain, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1908), p. 76, 1909.	Granite.	
15	I''.(3)4.2(3).(3)4.	Q 33.06 hy 6.26 or 16.68 mt 0.33 ab 28.82 an 12.79 C 1.22	Kemp Mountain, n. Cid, Davidson County, North Carolina.	J. E. Pogue, jr.	J. E. Pogue, jr., A. J. S., XXVIII, p. 226, 1909.	Dacite.	Also in N. C. G. S. B. 22, p. 57, 1910.
16	I.4.2.4⊙	Q 28.38 hy 2.52 or 17.24 mt 2.09 ab 36.15 il 0.76 an 11.95 C 0.71	Fairfield, Broad River, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S. (IV), B. 2, p. 201, 1908.	Granite.	
17	I.4.2.''4.	Q 20.88 di 1.33 or 20.57 hy 2.42 ab 40.35 mt 1.62 an 11.40 il 0.76	Clover, York County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S. (IV), B. 2, p. 216, 1908.	Granite.	
18	I.4''.''2.4.	Q 15.96 di 0.46 or 22.80 hy 2.05 ab 49.78 an 7.78	Campbell County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 216, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 108, 1902.
19	I.4''2.(3)4.	Q 15.06 di 0.49 or 27.24 hy 3.61 ab 44.01 an 10.01	Oglesby, Elbert County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 203, 1901.	Granite.	Also in Ga. G. S. B. 9A, p. 221, 1902.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
20	69.17	16.47	1.23	n. d.	0.61	2.02	4.89	4.41	1.06						99.86	
A4. IV	1.153	.161	.008	(.016)	.015	.038	.079	.047								
21	69.08	17.67	1.41	n. d.	0.64	3.27	4.56	3.29	0.56						100.48	
A4. IV	1.151	.173	.009	(.018)	.016	.059	.074	.035								
22	68.38	17.79	1.21	n. d.	0.72	2.85	4.36	3.57	0.78						99.66	2.689
A4. IV	1.140	.174	.008	(.016)	.018	.051	.070	.038								
23	73.09	15.40	0.65	2.10	0.12	1.74	4.57	2.01	0.17						99.85	
A3. III	1.218	.151	.004	.029	.003	.031	.074	.021								
24	69.70	18.72	0.65	0.79	0.45	2.25	5.01	1.68	0.71						99.96	
A3. III	1.102	.185	.004	.011	.011	.010	.080	.018								
25	67.42	15.88	1.37	1.14	1.43	3.49	6.42	2.65	0.05						99.92	
A3. III	1.124	.155	.009	.016	.036	.062	.103	.030								
26	66.84	18.22	2.27	0.20	0.81	3.31	5.14	2.80	0.46			trace			100.05	
A3. III	1.114	.179	.014	.003	.020	.059	.083	.030				—				
27	70.05	15.04	0.70	1.32	1.04	2.46	4.03	3.33	1.12	0.70	0.36	0.08	0.03	CO ₂ none ZrO ₂ 0.02 SO ₃ none S none BaO 0.10 Li ₂ O 0.05	100.43	
A1. I	1.168	.147	.004	.018	.026	.044	.065	.035			.005	—	—			
28	67.55	15.68	0.98	1.02	1.11	2.51	4.15	2.86	2.76	0.38	0.34	0.12	trace	CO ₂ none ZrO ₂ none SO ₃ none Cl 0.05 BaO 0.11 SrO 0.03 Li ₂ O none	99.65	
A1. I	1.126	.153	.006	.014	.028	.045	.062	.030			.004	.001	—			
29	66.28	16.21	0.80	2.06	1.57	3.53	4.36	3.20	0.78	0.12	0.50	0.20	trace	BaO 0.34 SrO 0.05	100.00	
A2. II	1.105	.150	.005	.029	.049	.063	.070	.035			.006	.001	—			
30	69.93	14.95	1.78	0.55	0.60	1.46	5.30	3.99	0.32	0.12	0.33	0.33	trace	BaO 0.29 SrO 0.06 Li ₂ O none	100.01	
A1. I	1.166	.147	.011	.008	.015	.026	.085	.042			.004	.002	—			
31	65.87	16.82	1.58	1.23	1.51	2.65	4.72	3.15	1.43		0.37		trace		99.36	2.62
B3. IV	1.098	.165	.010	.017	.039	.017	.076	.034			.005		—			
32	62.58	16.42	2.46	1.96	1.81	2.47	4.57	3.91	1.40	0.38	0.40	0.33	0.08	CO ₂ 0.77 BaO 0.41 SrO 0.10 Li ₂ O trace	100.08	
A1. I	1.043	.161	.015	.028	.046	.045	.073	.041			.005	.002	.001			
33	69.56	15.29	0.86	2.06	0.69	2.81	3.97	3.36	0.86		0.55	0.16			100.17	
A2. II	1.189	.150	.005	.029	.017	.050	.064	.036			.007	.001				
34	68.95	14.33	1.17	1.23	0.47	2.13	5.08	2.58	3.63	0.28	0.42	0.10	trace	ZrO ₂ 0.03 BaO 0.08 SrO trace Li ₂ O trace	100.18	
A1. I	1.149	.110	.007	.017	.012	.038	.082	.028			.005	.001	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSÉ—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
20	I.4''.2.(3)4.	Q 17.64 hy 3.61 or 26.13 ab 41.39 an 10.01	Near Atlanta, Fulton County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 216, 1901.	Granite.	Also in J. G., IX, p. 119, 1901.
21	I.4.2(3)''4.	Q 20.70 hy 3.98 or 19.46 ab 38.77 an 16.40 C 0.52	Newnan, Coweta County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 205, 1901.	Granite.	Also in Ga. G. S. B. 9A. p. 87, 1902.
22	I.4.2''.(3)4.	Q 21.36 hy 3.91 or 21.13 ab 36.68 an 14.18 C 1.53	Newnan, Coweta County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A. p. 85, 1902.	Granite.	
23	I''.(3)4.2.4.	Q 33.48 hy 3.60 or 11.68 mt 0.93 ab 38.77 an 8.62 C 2.55	Marquette, Fox River Val- ley, Wisconsin.	W. W. Daniells.	Hobbs and Leith, B. Un. Wisc. No. 158, p. 262, 1907.	Aporhyolite porphyry.	
24	I.4.2.4''.	Q 28.59 hy 2.02 or 10.01 mt 0.93 ab 41.92 an 11.12 C 4.79	Kawishiwi River, Minnesota.	A. D. Meeds.	U. S. Grant, Minn. G. S. 21 A. R., p. 43, 1893.	Quartz porphyry.	In W. T., p. 173.
25	I(II).4(5).(1)2.4.	Q 11.94 di 8.83 or 16.68 hy 0.33 ab 53.97 mt 2.09 an 6.22	Kekequabic Lake, Minnesota.	Dodge and Sidener.	U. S. Grant, Minn. G. S. 21 A. R., p. 41, 1893.	Augite granite (porphy- ritic).	Also in A. G., XI, p. 385, 1893. In W. T., p. 173.
26	I.4.2''4.	Q 17.88 hy 2.00 or 19.46 mt 0.70 ab 43.49 hm 1.76 an 16.40 C 0.51	Kekequabic Lake, Minnesota.	Dodge and Sidener.	U. S. Grant, Minn. G. S. 21 A. R., p. 41, 1893.	Augite granite.	Also in A. G., XI, p. 385, 1893. In W. T., p. 173.
27	I.4.2.(3)4.	Q 26.70 hy 3.79 or 19.46 mt 0.93 ab 34.06 il 0.76 an 12.23 C 0.31	Anaconda Range, Philipsburg quadrangle, Montana.	G. Steiger.	Emmons and Calkins, U. S. G. S. P. P. 78, p. 106, 1913.	Granodiorite.	
28	I''4.2''''4.	Q 27.48 hy 3.33 or 16.68 mt 1.39 ab 32.19 il 0.61 an 11.68 ap 0.34 C 1.92	Big Butte, Butte, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. P. P. 74, p. 45, 1912.	Rhyolite- dacite obsidian.	In W. T., p. 175.
29	I(II).4.2''''4.	Q 17.76 di 0.89 or 19.46 hy 6.34 ab 36.68 mt 1.15 an 15.01 il 0.91 ap 0.51	Sweet Grass Creek, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 142, 1897.	Porphyrite.	In W. T., p. 173.
30	I.4.(1)2''4.	Q 21.06 hy 1.50 or 23.35 mt 0.93 ab 44.64 il 0.61 an 5.28 hm 1.12 ap 0.67	North part of Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 142, 1897.	Granite porphyry.	In W. T., p. 173.
31	I''4.2''4.	Q 18.12 hy 4.30 or 18.90 mt 2.32 ab 39.82 il 0.61 an 13.07 C 0.32	Castle, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 106, 1896.	Porphyry.	In W. T., p. 173.
32	I(II).4(5).2.(3)4.	Q 13.68 hy 5.79 or 22.80 mt 3.48 ab 38.25 il 0.76 an 10.56 ap 0.67 C 0.92	Near Yogo Peak, Little Belt Mountains, Montana.	W. F. Hille- brand.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 514, 1906.	Syenite porphyry.	In W. T., p. 175.
33	I''4.2''.(3)4.	Q 25.86 hy 3.94 or 20.02 mt 1.16 ab 33.54 il 1.06 an 13.07 ap 0.34 C 0.31	Schafer Butte, Boise County, Idaho.	G. Steiger.	W. Lindgren, U. S. G. S. A. R. 20, III, p. 81, 1900.	Quartz monzonite.	In W. T., p. 175.
34	I.4.2.4. ⊙	Q 24.42 di 1.14 or 15.57 hy 1.30 ab 12.97 mt 1.62 an 5.34 il 0.76 ap 0.34	Nez Percés Region, Idaho.	W. F. Hille- brand.	I. C. Russell, U. S. G. S. B. 228, p. 158, 1904.	Volcanic sand.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
35	68.43	16.08	1.59	n. d.	1.15	2.93	5.36	4.19	0.61	0.11			0.26		100.71	
A4. IV	1.141	.158	.010	(.020)	.029	.052	.086	.045					.004			
36	75.50	13.25	1.02	0.91	0.07	0.90	4.76	2.85	0.41		none	none	none	SO ₃ 0.32 Li ₂ O 0.06	100.05	
A2. II	1.258	.130	.006	.012	.002	.016	.077	.031			—	—	—			
37	72.59	13.47	1.58	1.32	1.05	2.12	4.63	2.52	0.18		0.52		none	FeS ₂ 0.26	100.24	
A2. II	1.255	.132	.010	.018	.026	.038	.074	.026			.006		—			
38	70.52	15.85	2.28	0.36	0.09	2.59	3.93	3.43	0.36		trace	0.17	0.09	SO ₃ 0.29 Li ₂ O trace	99.95	
A2. II	1.175	.155	.014	.005	.002	.047	.063	.036			—	.001	.001			
39	70.24	17.36	1.38	0.79	0.53	2.74	3.69	2.65	0.71		trace	trace	none	CO ₂ none SO ₃ trace Cl none Li ₂ O none	100.09	
A2. II	1.171	.170	.009	.011	.013	.049	.059	.029			—	—	—			
40	69.24	15.30	1.72	0.69	0.95	2.98	4.46	2.52	1.30		0.65	trace	trace	SO ₃ 0.27 Li ₂ O none	100.08	
A2. II	1.154	.150	.011	.010	.024	.053	.072	.027			.008	—	—			
41	67.95	14.98	2.33	0.95	1.42	3.98	4.39	2.86	0.61	0.37	0.45	0.07	0.09	SO ₃ 0.11 BaO 0.23 SrO trace	100.79	
A1. I	1.133	.147	.015	.013	.036	.071	.071	.030			.006	—	.001			
42	67.49	16.18	1.30	1.22	1.34	2.68	4.37	2.40	2.69		0.13	0.13	0.08		100.01	
A2. II	1.125	.159	.008	.017	.034	.048	.070	.026			.002	.001	.001			
43	66.64	16.22	1.84	1.06	1.25	2.41	5.11	3.86	0.55	0.52	0.29	0.16	trace	CO ₂ none ZrO ₂ 0.01 S trace Cr ₂ O ₃ trace V ₂ O ₅ 0.01 BaO 0.27 SrO 0.14	100.34	
A1. I	1.111	.159	.012	.015	.031	.043	.082	.041			.004	.001	—			
44	65.64	17.29	3.07	1.29	1.78	1.98	5.77	2.44	1.03		none	0.23	trace	CO ₂ 0.17 SO ₃ trace Cl trace Li ₂ O 0.04	100.73	
A2. II	1.094	.170	.019	.018	.045	.036	.093	.026			—	.002	—			
45	64.65	17.80	2.33	2.10	0.81	1.73	4.18	2.83	3.06		trace	trace	trace	SO ₃ 0.43 Li ₂ O 0.17	100.09	
A3. III	1.078	.175	.014	.030	.020	.032	.068	.030			—	—	—			
46	67.78	16.67	1.99	0.51	0.71	2.67	4.91	3.43	1.44			0.19	trace		100.30	
A3. III	1.130	.163	.013	.007	.018	.048	.079	.036				.001	—			
47	68.30	16.24	1.60	1.63	1.05	2.79	3.90	3.52	0.71			0.13	0.12	BaO trace SrO 0.04 Li ₂ O trace	100.03	
A2. II	1.138	.159	.010	.022	.026	.050	.063	.037				.001	.002			
48	67.49	17.76	2.54	0.08	0.35	1.67	5.03	4.40	0.52			trace	trace		99.84	
A3. III	1.125	.174	.015	.001	.009	.030	.080	.047				—	—			
49	66.46	17.91	2.42	0.35	0.49	2.89	4.79	3.74	1.01				trace		100.06	
A3. III	1.108	.175	.015	.005	.012	.051	.077	.039					—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
35	I''4(5)''2.(3)4.	Q 13.38 di 5.78 or 25.02 hy 3.18 ab 45.06 an 7.51	White Knob, Mackay, Idaho.	T. T. Read.	Hemp and Gunther, Tr. Am. Inst. M. E., XXXVII, p. 311, 1907.	Quartz porphyry.	
36	I.(3)4.(1)2.4.	Q 34.20 hy 0.99 or 17.24 mt 1.89 ab 40.35 an 4.45 C 0.61	Obsidian Cliff, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. B. 150, p. 160, 1898.	Rhyolite.	Also in U. S. G. S. Mon. 32, (II), p. 426, 1899. In W. T., p. 175.
37	I''4.2.4.	Q 30.42 di 1.30 or 14.46 hy 2.26 ab 33.78 mt 2.32 an 8.90 fl 0.91	Near Willow Park, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 426, 1899.	Obsidian.	In W. T., p. 175.
38	I''4.2.(3)4.	Q 29.46 hy 0.20 or 20.02 mt 1.39 ab 33.01 hm 1.28 an 12.23 ap 0.34 C 1.22	Bunsen Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 87, 1899.	Dacite porphyry.	In W. T., p. 175.
39	I.(3)4.2(3)''4.	Q 31.80 hy 1.56 or 16.12 mt 2.09 ab 30.82 an 13.62 C 3.37	Birch Hills, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 163, 1899.	Dacite porphyry.	In W. T., p. 175.
40	I.4.2.4.⊙	Q 26.04 hy 2.40 or 15.01 mt 0.46 ab 37.73 fl 1.22 an 14.18 hm 1.44	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 116, 1899.	Quartz diorite porphyrite.	Also in U. S. G. S. A. R. 12, p. 627, 1891. In W. T., p. 175.
41	I(II).4.2''4.	Q 22.44 di 5.40 or 16.68 hy 1.10 ab 37.20 mt 1.86 an 11.79 fl 0.91 hm 1.12	Sepulchre Moun- tain, Yellowstone National Park.	T. M. Chatard.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 272, 1899.	Andesite breccia.	In W. T., p. 175.
42	I''4.2''4.	Q 25.02 hy 4.52 or 14.46 mt 1.86 ab 36.68 fl 0.30 an 12.51 ap 0.34 C 1.84	Sepulchre Moun- tain, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. A. R. 12, p. 648, 1891.	Dacite.	Also in U. S. G. S. Mon. 32, (II), p. 135, 1899. In W. T., p. 175.
43	I''4''2''4.	Q 15.96 di 0.86 or 22.80 hy 2.70 ab 42.97 mt 2.55 an 10.01 fl 0.61 hm 0.16 ap 0.34	Sulphur Creek Basin, Yellow- stone National Park.	W. F. Hille- brand.	Hague and Jaggard, U. S. G. S. B. 168, p. 95, 1900.	Syenite porphyry.	In W. T., p. 175.
44	I''4''2.4.	Q 16.62 hy 4.50 or 14.46 mt 4.18 ab 48.73 hm 0.16 an 8.06 ap 0.67 C 2.24	Gray Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 81, 1899.	Andesite porphyry.	In W. T., p. 175.
45	I''4.2.4.	Q 23.64 hy 4.11 or 26.13 mt 3.24 ab 35.63 an 8.34 C 4.79	Elk Creek, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 325, 1899.	Trachyte- rhyolite.	In W. T., p. 175.
46	I.4.2.4.⊙	Q 19.92 hy 1.80 or 20.02 mt 1.62 ab 41.40 hm 0.96 an 12.51 ap 0.34 C 0.31	Garfield Peak, Wyoming.	L. G. Eakins.	W. Cross, U. S. G. S. B. 148, p. 116, 1897.	Dacite.	In W. T., p. 175.
47	I''4.2''.(3)4.	Q 24.24 hy 4.45 or 20.57 mt 2.32 ab 33.01 ap 0.34 an 13.07 C 1.22	Chicago Mountain, Ten Mile District, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 14, p. 227, 1894.	Quartz porphyrite.	In W. T., p. 177.
48	I.4.2.(3)4.	Q 17.64 hy 0.90 or 26.13 mt 0.23 ab 41.92 hm 2.24 an 8.34 C 1.73	Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, II, p. 324, 1896.	Dacite.	In W. T., p. 175.
49	I.4.2.''4.	Q 17.88 hy 1.20 or 21.68 mt 1.16 ab 40.35 hm 1.60 an 14.28 C 0.82	Bald Mountain, Rosita, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, II, p. 324, 1896.	Dacite.	In W. T., p. 177.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
50	65.71	18.30	1.19	1.53	0.98	2.17	5.00	3.95	1.39				0.02		100.24	
A3. III	1.095	.179	.007	.021	.025	.039	.080	.042								
51	64.72	14.18	1.58	0.40	0.50	2.62	3.88	1.82	6.82	2.68	0.43	0.08	trace	CO ₂ trace SO ₃ trace Cl trace BaO 0.28 SrO 0.21	100.20	
A1. I	1.079	.139	.010	.006	.013	.046	.063	.020			.005	—	—			
52	61.36	16.36	3.59	1.45	1.75	3.59	4.04	3.64	1.56	1.34	0.51	0.36	0.07	CO ₂ 0.64 BaO 0.12 SrO 0.12	100.50	
A1. I	1.023	.160	.023	.020	.044	.064	.065	.036			.006	.003	.001			
53	65.30	15.92	1.37	2.19	1.59	3.89	4.01	3.08	0.78	0.34	0.50	0.29	0.05	CO ₂ 0.27 ZrO ₂ none S 0.20 Cr ₂ O ₃ none BaO 0.12 SrO none	99.20	
B1. II	1.088	.156	.009	.031	.040	.070	.065	.033			.006	.002	—			
54	65.27	15.75	2.31	1.85	1.62	4.09	3.92	3.25	0.53	0.21	0.55	0.25	0.10	CO ₂ trace ZrO ₂ 0.02 SO ₃ none Cl 0.01 FeS ₂ 0.02 Cr ₂ O ₃ none BaO 0.11 SrO 0.05 Li ₂ O trace	99.91	
A1. I	1.088	.155	.014	.026	.041	.073	.063	.035			.007	.002	.001			
55	67.98	15.53	2.68	0.18	1.47	3.39	4.53	3.00	1.05	0.11	0.34	0.33	0.04	CO ₂ none S none	100.63	
A2. II	1.133	.162	.017	.003	.037	.061	.073	.032			.004	.002	—			
56	65.78	17.32	3.68	0.46	0.47	1.66	5.23	4.64	0.14		0.27	0.13	0.32		100.10	
A2. II	1.096	.170	.023	.007	.012	.030	.084	.049			.003	.001	.005			
57	63.11	16.75	2.68	1.39	1.22	3.88	4.76	3.48	1.09	0.32	0.80	0.25	0.11	CO ₂ none ZrO ₂ none S 0.03 BaO 0.16	100.03	
A1. I	1.052	.164	.017	.019	.031	.070	.077	.037			.010	.002	.002			
58	62.36	17.78	2.74	1.66	1.37	4.49	4.75	3.37	0.26	0.11	0.73	0.29	0.12	CO ₂ none ZrO ₂ none S 0.03 BaO 0.03	100.09	
A1. I	1.039	.174	.017	.023	.034	.080	.077	.036			.009	.002	.002			
59	68.76	15.22	2.72	1.74	0.72	1.68	4.42	3.73	0.66	0.16	0.31	0.15	trace	CO ₂ none SO ₃ none Cl trace	100.27	2.48
A2. II	1.146	.149	.017	.024	.018	.030	.071	.039			.004	.001	—			
60	66.98	16.47	2.31	2.14	0.52	2.02	5.05	3.32	0.59	0.12	0.35	0.13	trace	CO ₂ none SO ₃ none Cl trace	100.00	2.48
A2. II	1.116	.161	.014	.029	.013	.036	.082	.035			.004	.001	—			
61	66.85	16.48	2.96	0.43	1.27	3.06	4.70	2.48	1.66	0.09	0.39	0.11		CO ₂ none SO ₃ none Cl trace	100.48	2.48
A2. II	1.114	.162	.019	.006	.032	.055	.076	.027			.005	.001				
62	66.50	16.55	2.25	2.58	0.87	2.75	4.55	3.36	0.16	0.12	0.59	0.19	trace	CO ₂ none SO ₃ none Cl trace	100.47	2.56
A2. II	1.108	.162	.014	.036	.022	.049	.074	.036			.007	.001	—			
63	65.99	16.14	2.28	1.84	1.47	3.57	4.73	2.90	0.67	0.15	0.68	0.15		CO ₂ none ZrO ₂ trace SO ₃ none Cl trace	100.57	2.53
A2. II	1.100	.158	.014	.025	.037	.064	.076	.031			.009	.001				

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DSODIC. LASSENSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
50	I.4".2".4.	Q 14.76 hy 4.35 or 23.35 mt 1.62 ab 41.92 an 10.84 C 1.84	Crested Butte, West Elk Moun- tains, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 14, p. 227, 1894.	Quartz porphyry.	In W. T., p. 177.
51	I".4.2".4.	Q 28.05 di 0.22 or 11.12 hy 1.20 ab 33.01 mt 0.23 an 12.79 il 0.76 hm 1.44	Windy Gap, Telluride quad- rangle, Colorado.	H. N. Stokes.	W. Cross, U. S. G. S. Fol. 57, p. 6, 1899.	Rhyolite vitrophyre.	Not in W. T.
52	I(II).4.2.(3)4.	Q 16.98 hy 4.40 or 21.13 mt 3.48 ab 34.06 il 0.91 an 10.84 hm 1.28 C 1.84 ap 1.01 Cc 1.50	Porphyry Basin, Ouray quad- rangle, Colorado.	G. Steiger.	Cross and Howe, U. S. G. S. Fol. 153, p. 12, 1907.	Quartz monzonite porphyry.	
53	I(II).4.2(3)".4.	Q 19.32 di 1.11 or 18.35 hy 5.71 ab 34.06 mt 2.09 an 16.12 il 0.91 ap 0.67	Troy, Ray District, Arizona.	W. T. Schaller.	F. L. Ransome, U. S. G. S. rec. lab.	Diorite porphyry.	
54	I(II).4.2(3).(3)4.	Q 19.80 di 1.97 or 19.46 hy 3.96 ab 33.01 mt 3.25 an 15.85 il 1.06 ap 0.67	Big Cottonwood Canyon, Park City quadrangle, Utah.	W. F. Hille- brand.	J. M. Boutwell, U. S. G. S. B. 419, p. 122, 1910.	Granite.	
55	I".4.2.4.	Q 21.90 di 1.51 or 17.79 hy 3.00 ab 38.25 il 0.46 an 13.07 hm 2.68 ap 0.67	Johnsons Mesa, Colfax County, New Mexico.	J. G. Fairchild.	J. B. Mertie, U. S. G. S. rec. lab.	Trachyte.	
56	I".4(5)".2.(3)4.	Q 13.92 hy 1.20 or 27.24 mt 2.09 ab 44.02 il 0.46 an 7.23 hm 2.24 C 1.02 ap 0.34	San Mateo Mountain, Mount Taylor, New Mexico.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 185, 1897.	Andesite.	In W. T., p. 177.
57	I(II).4(5).2".4.	Q 13.02 di 4.32 or 20.57 hy 1.10 ab 40.35 mt 2.55 an 13.90 il 1.52 hm 0.96 ap 0.67	Ortiz Mountains, near Albu- querque, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 231, 1908.	Dacite.	
58	I".4(5).2(3)".4.	Q 11.58 di 2.59 or 20.02 hy 2.20 ab 40.35 mt 3.25 an 16.96 il 1.37 hm 0.80 ap 0.67	Ortiz Mountains, near Albu- querque, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 321, 1908.	Dacite.	
59	I".4.2.(3)4.	Q 24.66 hy 2.20 or 21.68 mt 3.94 ab 37.20 il 0.61 an 7.51 ap 0.34 C 1.22	Kendrick Peak, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 116, 1913.	Dacite.	
60	I".4.2.4.	Q 19.44 hy 2.75 or 19.46 mt 3.25 ab 42.97 il 0.61 an 9.17 ap 0.34 C 1.12	O'Leary Peak, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 117, 1913.	Dacite.	
61	I".4.2".4.	Q 21.60 hy 3.20 or 15.01 mt 0.23 ab 39.82 il 0.76 an 14.46 hm 2.88 C 0.71 ap 0.34	Mormon Mountain, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 127, 1913.	Dacite.	
62	I".4.2".4.	Q 19.14 hy 4.18 or 20.02 mt 3.25 ab 38.77 il 1.06 an 12.79 ap 0.34 C 0.61	San Francisco Peak, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 120, 1913.	Dacite.	
63	I(II).4.2".4.	Q 13.42 di 2.16 or 17.24 hy 2.96 ab 39.82 mt 3.25 an 14.18 il 1.37 ap 0.34	Bill Williams Moun- tain, San Fran- cisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 129, 1913.	Dacite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
64	65.92	17.12	4.68	0.15	0.86	2.59	4.49	3.10	0.26	0.10	0.51	0.25		CO ₂ none SO ₃ none Cl trace	100.05	2.60
A2. II	1.099	.168	.029	.002	.022	.046	.073	.033			.006	.002				
65	64.60	16.60	2.62	2.38	0.93	3.06	5.12	3.43	0.10	0.18	0.80	0.18	0.06	CO ₂ none SO ₃ none Cl trace BaO 0.04 SrO none	100.10	2.66
A1. I	1.077	.163	.016	.033	.023	.055	.082	.036			.010	.001	—			
66	64.82	18.27	3.48	0.56	0.85	2.89	5.05	2.67	0.20		0.56	0.23	0.20			99.78
A2. II	1.080	.179	.022	.008	.021	.052	.081	.028			.007	.002	.003			
67	70.95	16.30	1.01	0.36	0.23	1.85	5.16	3.34	0.37	0.26	0.23	trace	trace	ZrO ₂ trace SO ₃ trace S trace BaO 0.04	100.10	
A2. II	1.183	.160	.006	.005	.006	.033	.083	.035			.003	—	—			
68	69.35	15.71	1.18	0.43	0.36	1.79	4.78	3.63	0.97	1.15	0.19	0.08	trace	ZrO ₂ trace S trace BaO 0.07	99.71	
A2. II	1.156	.154	.008	.006	.009	.032	.077	.038			.002	—	—			
69	68.95	15.84	1.14	0.56	0.24	1.96	4.56	3.69	1.49	0.86	0.22	0.08	trace	ZrO ₂ 0.01 S none BaO 0.07	99.67	
A1. I	1.149	.155	.007	.008	.006	.035	.074	.039			.003	—	—			
70	68.04	17.20	0.34	0.67	1.05	2.21	5.33	2.65	1.23	0.60	0.41	0.12	0.06	ZrO ₂ 0.01 V ₂ O ₅ trace FeS ₂ 0.24 CuS 0.02 ZnS 0.03 BaO 0.10 SrO 0.03 MoO none	100.34	
A1. I	1.134	.169	.002	.009	.026	.039	.085	.029			.005	.001	.001			
71	68.04	15.82	2.34	0.84	0.80	3.26	3.93	3.32	0.77	0.37	0.42	0.15	0.07	CO ₂ 0.04 ZrO ₂ none S trace NiO trace BaO 0.06 SrO 0.01 Li ₂ O trace Cu trace	100.24	
A1. I	1.134	.155	.015	.012	.020	.058	.063	.035			.005	.001	.001			
72	63.18	16.47	2.36	2.28	1.33	4.77	4.40	2.93	0.60	0.27	0.60	0.28	0.15	BaO 0.15 SrO 0.09 Li ₂ O trace	99.86	
A1. I	1.053	.162	.015	.032	.033	.085	.071	.031			.008	.002	.002			
73	67.04	16.71	1.46	2.08	1.09	3.26	5.07	1.84	0.51	0.08	0.51	0.27	0.16	CO ₂ none ZrO ₂ 0.05 S none NiO none BaO 0.03 SrO trace	100.16	
A1. I	1.117	.164	.009	.029	.027	.058	.082	.020			.006	.002	.002			
74	67.01	17.91	1.30	n. d.	0.42	1.86	5.33	4.56	0.48	0.16	0.10	trace	trace	CO ₂ none BaO 0.60 SrO 0.13 Li ₂ O none	99.86	
A2. II	1.117	.175	.008	(.016)	.011	.033	.085	.049			.001	—	—			
75	73.16	12.78	1.43	1.20	0.55	2.00	3.84	3.08	0.87	0.06	0.30	0.15	trace			99.42
A2. II	1.219	.125	.009	.017	.014	.036	.062	.033			.004	.001	—			
76	72.32	14.53	0.67	1.37	0.58	1.52	4.46	3.51	0.67	0.06	0.30	0.17	0.02			100.18
A2. II	1.205	.142	.004	.019	.015	.027	.072	.037			.004	.001	—			
77	71.41	14.38	1.33	1.17	1.13	2.51	4.12	2.97	0.30	0.09	0.34	0.13	0.04	CO ₂ 0.12 BaO 0.03	100.07	2.653
A2. II	1.190	.141	.008	.016	.028	.045	.066	.032			.004	.001	—			
78	75.32	13.17	0.27	0.98	0.42	1.48	4.77	2.14	0.73	0.18	0.16	0.04	trace	CO ₂ 0.03 ZrO ₂ none FeS ₂ 0.09 BaO 0.23 SrO 0.02	100.03	
A1. I	1.255	.129	.002	.014	.011	.026	.077	.022			.002	—	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
64	I''4.2.4.	Q 21.78 hy 2.20 or 18.35 il 0.30 ab 38.25 hm 4.68 an 10.84 ru 0.32 C 2.35 ap 0.67	Elden Mountain, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 125, 1913.	Dacite.	
65	I(II).4''2.4.	Q 14.52 di 1.57 or 20.02 hy 2.46 ab 42.97 mt 3.71 an 12.51 il 1.52 ap 0.34	San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 123, 1913.	Dacite.	
66	I''4.2.4.	Q 18.90 hy 2.10 or 15.57 mt 0.93 ab 42.44 il 1.06 an 12.51 hm 2.88 C 2.55 ap 0.67	San Francisco Mountains, Arizona.	T. M. Chatard.	U. S. G. S. B. 148, p. 188, 1897.	Andesite.	In W. T., p. 177.
67	I.4.2.4⊙	Q 24.18 hy 0.60 or 19.46 mt 0.46 ab 43.49 il 0.46 an 9.17 hm 0.64 C 0.92	Schultze Ranch, Globe District, Arizona.	W. F. Hille- brand.	F. L. Ransome, U. S. G. S. P. P. 12, p. 69, 1903.	Granitite.	
68	I.4.2.''4.	Q 23.58 hy 0.90 or 21.13 mt 1.39 ab 40.35 il 0.30 an 8.90 hm 0.32 C 0.91	Schultze Ranch, Globe District, Arizona.	W. F. Hille- brand.	F. L. Ransome, U. S. G. S. P. P. 12, p. 69, 1903.	Granite porphyry.	
69	I.4.2.(3)4.	Q 23.70 hy 0.60 or 21.68 mt 0.93 ab 38.77 il 0.46 an 9.73 hm 0.48 C 0.71	Hog Ranch, Globe District, Arizona.	W. F. Hille- brand.	F. L. Ransome, U. S. G. S. P. P. 12, p. 69, 1903.	Granite porphyry.	
70	I.4.2.4.⊙	Q 21.00 hy 2.86 or 16.12 mt 0.46 ab 44.54 il 0.76 an 10.01 ap 0.34 C 1.84	Ryerson Mine, Morenci District, Arizona.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. P. P. 43, p. 168, 1905.	Monzonite porphyry.	
71	I.4.2(3).(3)4.	Q 24.96 hy 2.00 or 19.46 mt 1.83 ab 33.01 il 0.76 an 15.29 hm 1.12 C 0.20 ap 0.34	Tombstone, Arizona.	R. C. Wells.	F. L. Ransome, U. S. G. S. rec. lab.	Rhyolite porphyry.	
72	I(II).4''2(3)4.	Q 15.54 di 4.02 or 17.24 hy 2.82 ab 37.20 mt 3.48 an 16.68 il 1.22 ap 0.67	Sierra Carrizo, Arizona.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 14, p. 165, 1894.	Hornblende porphyrite.	In W. T., p. 225.
73	I''4.2''4.	Q 21.48 hy 4.94 or 11.12 mt 2.09 ab 42.97 il 0.91 an 14.46 ap 0.67 C 1.02	Mount Sanford, Copper River Basin, Alaska.	G. Steiger.	W. C. Mendenhall, U. S. G. S. B. 228, p. 271, 1904.	Andesite.	
74	I.4(5).2.(3)4.	Q 13.98 hy 3.03 or 27.24 il 0.15 ab 44.54 an 10.29 C 0.41	Forty Mile Creek, n. Canyon Creek, Alaska.	H. N. Stokes,	J. E. Spurr, A. G., XXV, p. 231, 1900.	Alaskite porphyry.	In W. T., p. 177.
75	I.(3)4.2.''4.	Q 34.08 di 0.68 or 18.35 hy 1.60 ab 32.49 mt 2.09 an 8.34 il 0.61 ap 0.34	Collins Gulch, Tulameen Dis- trict, British Columbia.	M. F. Connor.	C. Camsell, Can. G. S. Mem. 26, p. 46, 1913.	Granite.	
76	I.4.2.''4.	Q 28.62 hy 2.95 or 20.57 mt 0.93 ab 37.73 il 0.61 an 6.67 ap 0.34 C 0.92	Otter Lake, Tulameen Dis- trict, British Columbia.	M. F. Connor.	C. Camsell, pers. com., 1913.	Granite.	
77	I.''4.2.''4.	Q 29.16 hy 3.33 or 17.79 mt 1.86 ab 34.58 il 0.61 an 11.68 ap 0.34 C 0.10	Silver Creek, Skagit Range, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38, (I), p. 537, 1912.	Granite.	
78	I.(3)4.2.4.	Q 35.28 hy 2.42 or 12.23 mt 0.46 ab 40.35 il 0.30 an 7.23 C 0.41	Bald Mountain, Port Orford quadrangle, Oregon.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Dacite porphyry.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
79	71.87	14.53	1.28	1.02	0.48	1.59	5.08	2.84	0.22	0.06	0.41	0.10	trace	CO ₂ none ZrO ₂ 0.04 SO ₃ none Cl trace S none Cr ₂ O ₃ none NiO none BaO 0.08 SrO 0.03 Li ₂ O trace	99.63	
A1. I	1.198	.142	.008	.014	.012	.029	.082	.030			.005	.001	—			
80	70.77	14.83	1.35	1.25	0.64	2.12	5.07	2.68	0.33	0.07	0.38	0.13	trace	CO ₂ none ZrO ₂ 0.05 SO ₃ none Cl 0.11 S none Cr ₂ O ₃ none NiO none BaO 0.08 SrO 0.02 Li ₂ O trace	99.88	
A1. I	1.176	.145	.009	.018	.016	.038	.082	.029			.005	.001	—			
81	70.10	15.18	1.78	1.09	0.74	2.27	5.15	2.58	0.19	0.10	0.48	0.13	trace	CO ₂ none ZrO ₂ 0.04 SO ₃ none Cl 0.03 S none Cr ₂ O ₃ none NiO none BaO 0.08 SrO 0.03 Li ₂ O trace	99.97	
A1. I	1.168	.149	.011	.015	.019	.041	.083	.027			.006	.001	—			
82	68.17	15.60	2.31	0.94	1.02	2.76	5.15	2.46	0.45	0.09	0.54	0.13	trace	CO ₂ none ZrO ₂ none SO ₃ none Cl trace S none Cr ₂ O ₃ none NiO none BaO 0.06 SrO 0.03 Li ₂ O trace	99.71	
A1. I	1.136	.153	.014	.013	.026	.049	.083	.027			.007	.001	—			
83	67.41	15.76	1.88	1.76	1.35	3.36	4.54	2.36	0.54	0.09	0.56	0.12	trace	CO ₂ none S 0.02 Cr ₂ O ₃ none BaO 0.06 SrO trace Li ₂ O none	99.81	
A1. I	1.124	.154	.011	.025	.034	.060	.073	.025			.007	.001				
84	70.65	15.57	0.57	1.26	0.48	3.28	4.91	1.77	0.86	0.14	0.21	0.07	0.06	CO ₂ trace ZrO ₂ 0.01 S 0.07 BaO 0.06 SrO trace	99.97	
A1. I	1.178	.153	.004	.018	.012	.059	.079	.020			.003	—	.001			
85	73.18	13.66	0.21	2.24	0.93	2.10	3.70	2.72	0.57	0.10	0.25	0.09	0.07	CO ₂ 0.17 BaO 0.10 SrO trace Li ₂ O trace	100.09	
A1. I	1.220	.134	.001	.031	.023	.038	.059	.029			.003	—	.001			
86	73.00	16.38	none	0.99	0.48	2.42	4.53	1.87	0.52						100.19	
A3. III	1.216	.161	—	.014	.012	.043	.072	.020								
87	71.88	15.57	1.07	0.30	0.68	2.93	5.81	1.80	0.68	0.11	0.17	0.08	none	CO ₂ none BaO 0.02 SrO 0.08 Li ₂ O none	100.28	
A1. I	1.198	.153	.007	.004	.017	.036	.093	.019			.002	—	—			
88	66.28	16.03	1.80	1.88	1.12	3.75	4.10	3.49	0.39	0.10	0.54	0.30	0.05	BaO 0.08 SrO trace Li ₂ O trace	99.91	
A2. II	1.105	.157	.011	.027	.028	.067	.066	.037			.007	.002	—			
89	70.36	15.47	0.98	1.17	0.87	3.18	4.91	1.71	1.00	0.06	0.20	0.11	trace	BaO 0.06 SrO trace Li ₂ O trace	100.08	
A2. II	1.173	.152	.007	.017	.022	.057	.079	.018			.003	.001				
90	69.06	16.23	0.88	1.53	1.34	3.17	4.06	3.02	0.45						100.04	
A3. III	1.156	.159	.005	.021	.034	.057	.085	.032								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
79	I.4.2.4⊙	Q 27.66 hy 1.33 or 16.68 mt 1.86 ab 42.97 il 0.76 an 7.23 ap 0.34 C 0.41	Llao Rock, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 140, 1902.	Dacite.	In W. T., p. 177.
80	I.4.2.4.⊙	Q 25.26 di 0.22 or 16.12 hy 2.03 ab 42.97 mt 2.09 an 9.45 il 0.76 ap 0.34	Llao Rock Flow, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 140, 1902.	Dacite.	In W. T., p. 177.
81	I.4.2.4.⊙	Q 24.78 hy 1.90 or 15.01 mt 2.09 ab 43.51 il 0.91 an 10.56 hm 0.32 C 0.10 ap 0.34	Cleetwood Cove, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 140, 1902.	Dacite.	In W. T., p. 177.
82	I''.4.2.4.	Q 21.66 di 0.65 or 15.01 hy 2.30 ab 43.49 mt 1.39 an 11.95 il 1.06 hm 1.28 ap 0.34	Wine Glass Grotto Cove, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 140, 1902.	Dacite.	In W. T., p. 177.
83	I''.4.2(3).4.	Q 22.98 hy 4.32 or 13.90 mt 2.55 ab 38.25 il 1.06 an 15.57 ap 0.34	South Rim of Crater, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 140, 1902.	Secretion in dacite.	
84	I.4.2(3).4.	Q 27.00 di 0.46 or 11.12 hy 2.55 ab 41.39 mt 0.93 an 15.01 il 0.46 ap 0.34	Riddles quadrangle, Oregon.	G. Steiger.	G. F. Kay, U. S. G. S. B. 419, p. 167, 1910.	Dacite porphyry.	
85	I''.(3)4.2''4.	Q 33.96 hy 5.86 or 16.12 mt 0.23 ab 30.92 il 0.46 an 10.56 C 0.82	Agua Fria Creek, Mariposa County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 691, 1896.	Soda granite.	Also in J. G., VII, p. 152, 1899. In W. T., p. 179.
86	I.(3)4.2''4.	Q 33.12 hy 3.05 or 11.12 ab 37.73 an 11.95 C 2.65	Rocklin, Placer County, California.	W. H. Melville.	W. Lindgren, U. S. G. S. B. 150, p. 172, 1898.	Granite.	In W. T., p. 179.
87	I.4.2.4''.	Q 26.22 hy 1.70 or 10.56 mt 0.46 ab 48.73 il 0.30 an 10.01 hm 0.80 C 0.51	Merced River, Mariposa County, California.	G. Steiger.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 721, 1896.	Granite porphyry.	Also in A. G., XVII, p. 387, 1896. In W. T., p. 179.
88	I''4.''2.(3)4.	Q 20.10 di 1.36 or 20.57 hy 3.46 ab 34.58 mt 2.55 an 15.01 il 0.91 ap 0.67	Lake Tenaya, Yosemite Park, Mariposa County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 482, 1894.	Granodiorite.	Also in J. G., III, p. 403, 1895. In W. T., p. 179.
89	I.4.2(3).4''.	Q 27.24 hy 3.12 or 10.01 mt 1.62 ab 41.40 il 0.46 an 15.01 ap 0.34 C 0.10	Near Enterprise, Butte County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14, p. 482, 1894.	Quartz diorite.	In W. T., p. 179.
90	I''4.2(3).''4.	Q 24.60 hy 5.51 or 17.79 mt 1.16 ab 34.06 an 15.85 C 0.51	Near Lassen Peak, California.	J. W. Shimer.	Hague and Iddings, A. J. S., XXVI, p. 232, 1883.	Dacite.	In W. T., p. 177.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
91	68.72	15.15	1.16	1.76	1.28	3.30	4.26	2.78	0.74		0.31	0.09	0.11	BaO 0.07 SrO 0.03 Li ₂ O trace	99.76	
A1. I	1.145	.148	.007	.025	.032	.069	.069	.030			.004	—	.002			
92	68.32	15.26	1.66	1.26	1.32	3.26	4.27	2.81	1.37		0.31	0.12	0.04	BaO 0.07 SrO trace Li ₂ O trace	100.07	
A2. II	1.139	.150	.010	.018	.033	.058	.069	.030			.004	.001	—			
93	67.89 ^d	17.29	2.39	0.21	0.66	3.01	5.11	1.69	1.34		0.21	0.12	0.12	BaO 0.03 SrO 0.04	100.11	
A1. I	1.132	.169	.015	.003	.017	.053	.082	.018			.003	.001	.002			
94	68.10	15.50	3.20	none	0.10	3.02	4.20	3.13	2.72		0.15	0.03	trace	BaO 0.06 SrO trace Li ₂ O none	100.21	
A2. II	1.135	.152	.020	—	.003	.053	.068	.033			.002	—	—			
95	66.30	17.55	2.19	0.55	0.97	3.12	5.15	2.45	1.25		trace	0.15	trace	SO ₂ 0.28	99.96	
A3. III	1.105	.172	.014	.008	.024	.055	.083	.026			—	.001	—			
96	68.65	16.34	0.93	1.48	1.29	3.07	4.85	1.85	0.62	0.24	0.28	0.15	0.08	BaO 0.09 SrO 0.07 Li ₂ O trace	99.99	
A1. I	1.144	.160	.006	.020	.032	.055	.078	.020			.004	.001	.001			
97	71.49	15.06	1.51	0.88	0.35	1.54	4.14	3.39	0.88	0.16	0.20	0.08	trace	CO ₂ none SrO trace	99.73	
A2. II	1.192	.148	.009	.013	.009	.028	.068	.036			.003	—	—			
98	67.70	15.95	1.53	1.14	1.23	2.70	4.83	3.74	0.36	0.19	0.23	trace	trace		99.60	
A3. III	1.128	.156	.009	.016	.031	.048	.078	.040			.003	—	—			
99	66.77	17.40	2.87	0.33	1.05	1.49	5.81	2.13	1.14		trace	none	0.12	CO ₂ none SO ₂ 0.87 PbO trace	99.98	
A2. II	1.113	.171	.018	.004	.026	.027	.094	.022			—	—	.002			
100	69.20	15.00	1.57	1.83	0.69	1.88	5.87	1.81	0.67	0.90	0.52	0.10	0.15	CO ₂ none	100.19	
A2. II	1.153	.147	.010	.025	.017	.034	.095	.019			.007	.001	.002			
101	70.09	15.13	1.72	1.13	1.22	2.61	3.61	2.75	0.78		0.67	0.11	0.08	CO ₂ trace ZrO ₂ 0.02 Cl 0.02 FeS ₂ 0.02 NiO none BaO none Cu 0.04 Pb none	99.98	
A1. I	1.168	.148	.011	.015	.031	.047	.058	.030			.008	.001	.001			
102	69.56	15.65	1.24	0.91	0.82	2.52	4.09	2.19	2.92			0.13			100.03	2.45
A3. III	1.159	.153	.007	.012	.021	.045	.066	.023				.001				
103	71.32	16.52	0.44	0.36	0.54	2.50	4.73	2.42	0.82		0.35	0.10			100.10	2.348 2.62
A2. II	1.190	.162	.003	.005	.014	.045	.076	.026			.004	.001				20°
104	65.23	13.86	4.78	0.52	2.12	4.52	3.96	1.88	2.41			trace		S 0.26	99.54	2.566
A3. III	1.087	.136	.030	.007	.053	.080	.065	.020				—				
105	67.47	16.25	2.22	0.82	0.46	1.36	6.08	3.67	0.69		0.57	0.10	0.03	S 0.09 BaO 0.06	99.87	
A1. I	1.125	.159	.014	.011	.012	.024	.098	.039			.007	.001	—			
106	69.43	15.74	0.93	3.35	1.35	2.07	4.56	2.99	0.10						100.52	
A3. III	1.157	.154	.006	.047	.034	.038	.073	.032								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENÖSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
91	I''4.2''4.	Q 23.70 di 2.38 or 16.68 hy 4.22 ab 36.16 mt 1.62 an 13.62 il 0.61	Chaos, Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 150, p. 218, 1898.	Dacite.	In W. T., p. 177.
92	I''4.2''4.	Q 24.12 di 0.86 or 16.68 hy 3.43 ab 36.16 mt 2.32 an 14.18 il 0.61 ap 0.34	West Base of Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 150, p. 218, 1898.	Dacite.	In W. T., p. 177.
93	I.4.2''4''.	Q 24.90 hy 1.70 or 10.01 mt 0.46 ab 42.97 il 0.46 an 13.90 hm 2.08 C 1.94 ap 0.34	Buntingville, Lassen County, California.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 195, 1897.	Andesite.	In W. T., p. 177.
94	I.4.2''4''.	Q 25.32 hy 0.30 or 18.35 hm 3.20 ab 35.63 tn 0.39 an 14.18	Bear Creek Falls, Shasta County, California.	R. B. Riggs.	J. S. Diller, U. S. G. S. B. 150, p. 215, 1898.	Dacite.	In W. T., p. 177.
95	I.4.2''4.	Q 19.38 hy 2.40 or 14.46 mt 1.86 ab 43.49 il 0.96 an 14.46 ap 0.34 C 1.22	Clear Creek, Shasta County, California.	J. E. Whitfield.	J. S. Diller, U. S. G. S. B. 148, p. 191, 1897.	Dacite porphyry.	In W. T., p. 179.
96	I''4.2''4.	Q 24.18 hy 4.65 or 11.12 mt 1.39 ab 40.87 il 0.61 an 14.46 ap 0.34 C 1.02	Indian Valley, Sierra County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 721, 1896.	Granodiorite.	Also in J. G., III, p. 403, 1895. In W. T., p. 179.
97	I''4.2.(3)4.	Q 30.48 hy 1.03 or 20.02 mt 2.09 ab 35.63 il 0.46 an 6.95 ap 0.34 C 1.94	Pinenut Range, Nevada.	H. N. Stokes.	J. E. Spurr, J. G., IX, p. 599, 1901.	Rhyolite.	
98	I''4.2''4.	Q 17.94 di 2.19 or 22.24 hy 2.60 ab 40.87 mt 2.09 an 10.66 il 0.46	Sing-ats-a Range, n. Watuska, Nevada.	D. T. Smith.	D. T. Smith, Un. Cal., B. Dep. G., IV, p. 20, 1904.	Granite porphyry.	
99	I.4.2.4.⊙	Q 20.22 hy 2.60 or 12.23 mt 1.39 ab 49.25 hm 1.92 an 7.51 C 2.86	Ciudad de Rocas, Durango, Mexico.	H. W. Nichols.	O. C. Farrington, Field Col. Mus., G. Ser., II, p. 205, 1904.	Rhyolite.	
100	I''4.2.4''.	Q 22.80 hy 3.02 or 10.56 mt 2.32 ab 49.78 il 1.05 an 8.62 ap 0.34 C 0.20	Ancon Hill, Panama, Canal Zone.	G. Steiger.	D. F. McDonald, U. S. G. S. rec. lab.	Rhyolite.	
101	I''4.2''4''.	Q 31.08 hy 3.50 or 16.68 mt 1.62 ab 30.39 il 1.22 an 12.23 hm 0.64 C 1.63 ap 0.34	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Br. Gui., p. 39, 1908.	Granite gneiss.	In W. T., p. 179.
102	I''4.2''4.	Q 30.90 hy 2.76 or 12.78 mt 1.62 ab 34.58 ap 0.34 an 12.51 C 2.24	Guaitara Slope, Loma de Ales, Colombia.	R. Kuch.	R. Kuch, G. Stud. Colomb., I, p. 147, 1892.	Dacite perlite.	Also in N. J., 1886, I, p. 48. In W. T., p. 179.
103	I.4.2.4.⊙	Q 28.80 hy 1.40 or 14.46 mt 0.23 ab 39.82 il 0.61 an 11.68 hm 0.32 C 1.84 ap 0.34	Quebrada de Punin, Cerros de Yaru- quies, Ecuador.	A. Lindner.	F. Tannhäuser, in W. Reiss, Ecuador, II, p. 143, 1904.	Dacite.	
104	I(II).4.2(3).4.	Q 23.58 di 6.26 or 11.12 hy 2.40 ab 34.06 mt 1.62 an 14.18 hm 3.68	Laguna de Papa- llacta, Antisana Volcano, Ecuador.	E. Esch.	E. Esch in W. Reiss, Ecuador, I, p. 90, 1901.	Dacite.	
105	I.4''.(1)2.4.	Q 14.94 hy 1.20 or 21.68 mt 0.93 ab 51.35 il 1.06 an 5.84 hm 1.90 C 0.10 ap 0.34	Cerro Cagual, Patagonia, Chile.	G. Nyblom.	P. D. Quensel, B. G. Inst. Ups., XI, p. 84, 1911.	Comendite granophyre.	
106	I''4.2.4''.	Q 22.50 hy 8.81 or 17.79 mt 1.39 ab 38.25 an 10.56 C 1.12	Juncal Valley, Argentina.	H. Schlapp.	A. Stelzner, Btr. G. Pal. Arg., I, p. 208, 1885.	Andengran- ite.	In W. T., p. 179.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
107	63.18	19.79	1.10	3.23	1.51	4.04	5.12	2.42	0.62						101.01	
B3. IV	1.053	.194	.007	.044	.038	.072	.082	.026								
108	68.12	12.13	n. d.	1.03	trace	1.63	5.34	1.69	9.70						99.64	
A4. IV	1.136	.119	—	.014	—	.029	.086	.018								
109	71.53	12.00	2.90	2.02	0.62	2.33	4.27	3.06	0.36	0.13	0.64	0.17	0.36	NiO 0.02 BaO 0.08	100.49	
A1. I	1.192	.118	.018	.028	.016	.044	.069	.033			.008	.001	.005			
110	74.80	13.89	trace	none	0.05	2.59	5.45	2.74	0.77						100.29	
A3. III	1.247	.136	—	—	.001	.047	.088	.029								
111	71.70	18.60	1.00	n. d.	0.25	1.96	4.05	2.54	0.50						100.60	
A4. IV	1.195	.182	.006	(.012)	.006	.035	.066	.027								
112	69.34	17.71	0.55	0.90	1.24	1.50	5.95	3.01			0.05				100.25	2.538
A3. III	1.156	.174	.003	.013	.031	.027	.096	.032			—					
113	67.70	15.48	2.60	2.94	0.93	2.20	4.48	1.77	1.96				trace		100.07	
A3. III	1.128	.152	.016	.041	.023	.039	.073	.019					—			
114	71.34	12.30	0.67	1.95	0.96	4.19	3.57	2.82	0.91	0.31	0.31				99.33	
B3. IV	1.189	.121	.004	.027	.024	.075	.058	.030			.004					
115	70.47	13.36	0.42	0.91	0.54	1.04	4.01	3.47	6.10				0.21		100.53	
A3. III	1.175	.131	.003	.012	.014	.019	.064	.037					.003			
116	73.47	15.42	1.02	n. d.	0.20	1.35	5.57	3.64	n. d.		0.12				100.79	
A4. IV	1.225	.151	.006	(.012)	.005	.024	.090	.038			.002					
117	65.06	19.41	1.80	1.06	0.47	2.94	6.30	1.69	0.57		0.83			F BaO trace 0.16	100.29	
A2. II	1.084	.190	.011	.015	.012	.053	.102	.018			.010					
118	72.13	14.95	1.10	0.90	0.18	1.97	5.99	2.50	0.28		none	trace	trace	S trace	100.00	
A3. III	1.202	.147	.007	.013	.005	.036	.097	.027			—	—	—			
119	71.66	15.29	1.81	0.51	0.09	1.71	5.75	2.61	0.33		trace	none	trace	S 0.24	100.00	
A3. III	1.194	.150	.011	.007	.002	.030	.093	.028			—	—	—			
120	70.23	15.47	1.96	1.07	0.84	3.03	4.84	1.87	0.50		none	none	trace	S 0.19	100.00	
A2. II	1.171	.152	.012	.015	.021	.054	.078	.020			—	—	—			
121	70.95	15.56	0.42	0.56	0.52	2.25	5.20	2.64	1.68		0.16		trace		99.94	
A3. III	1.183	.153	.003	.008	.013	.040	.084	.028			.002		—			
122 *	68.91	14.81	2.22	0.53	1.68	1.28	4.95	3.13	1.80		0.19		trace	F 0.07	99.57	
A3. III	1.149	.145	.014	.007	.042	.023	.080	.033			.002		—			
123	64.98	19.50	2.51	0.30	0.50	3.70	6.09	2.01	n. d.						99.59	
A3. III	1.083	.191	.015	.004	.013	.066	.098	.022								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENÖSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
107	I(II).4(5).2(3).4.	Q 11.16 hy 8.68 or 14.46 mt 1.62 ab 42.97 an 20.02 C 1.43	Gualilan, San Juan, Argentina.	B. Wetzig.	F. Tannhäuser, N. J. B. B., XXII, p. 581, 1906.	Dacite.	
108	I.4.(1).2.4''.	Q 27.54 di 3.23 or 10.01 hy 0.13 ab 44.54 an 4.45	Beruford, Iceland.	C. W. Schmidt.	C. W. Schmidt, Z. D. G. G., XXXVII, p. 778, 1885.	Pitchstone.	In W. T., p. 179.
109	I''.'4.(1).2.'4.	Q 30.24 di 5.07 or 18.35 mt 4.18 ab 36.15 il 1.22 an 4.45 ap 0.34	Ashval, Rum Island, Scotland.	W. Pollard.	A. Harker, G. S. Scot. Mem. Sh. 45, p. 139, 1908.	Quartz felsite.	
110	I.4.(1).2.4.	Q 28.74 wo 3.25 or 16.12 ab 46.11 an 5.28	Stanner, n. Old Radnor, Wales.	G. A. J. Cole.	G. A. J. Cole, G. M., XXIII, p. 223, 1886.	Quartz felsite.	In W. T., p. 179.
111	I.(3).4.2.4.	Q 32.94 hy 2.18 or 15.01 ab 34.58 an 9.73 C 5.51	La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Granulite (granite).	
112	I.4.''2.4.	Q 17.58 hy 4.42 or 17.79 mt 0.70 ab 60.30 an 7.51 C 1.94	Sancy, Mont Dore, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. Fr. Min., XXV, p. 326, 1902.	Trachyan- desite.	
113	I(II).''4.2.4.	Q 27.00 hy 5.60 or 10.56 mt 3.71 ab 38.25 an 10.84 C 2.14	Grand-Mont, n. Mont Blanc, France.	E. Ritter.	E. Ritter, B. Sv. Ct. G. Fr., IX, No. 60, p. 33, 1897.	Microgran- ulite (granite).	Not in W. T.
114	I(II).(3).4.2.''4.	Q 30.06 di 9.78 or 16.68 mt 0.93 ab 30.39 il 0.61 an 9.17	Mount Tibidabo, Barcelona, Spain.	W. Maier?	W. Maier, In Diss. Bres., 1908.	Granitite.	Ref. N. J., 1911, II, p. 241.
115	I.''4.''2.''4.	Q 30.30 hy 2.98 or 20.57 mt 0.70 ab 33.54 an 5.28 C 1.12	Puerto de Genoves, Cabo de Gata, Almeria, Spain.	A. Osann.	A. Osann, Z. D. G. G., XLIII, p. 689, 1891.	Liparite pumice.	In W. T., p. 179.
116	I.4.''2.4.	Q 23.64 hy 1.82 or 21.12 il 0.15 ab 47.16 an 0.67	Birkrem, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 96.	Hypersthene granite.	In W. T., p. 179.
117	I.4''2.4(5).	Q 14.76 hy 1.20 or 10.01 mt 1.16 ab 53.45 il 1.52 an 14.73 hm 0.96 C 1.73	Skougsnoien, n. Lindnaes, Bergen, Norway.	P. Schei.	C. F. Kolderup, Berg. Mus. Aarb., 1903, No. 12, p. 118.	Granite.	
118	I.4.''2.4.	Q 23.28 di 2.57 or 15.01 wo 0.23 ab 50.83 mt 1.62 an 6.39	Svanö, Sogn, Norway.	Landmark.	C. F. Kolderup, Berg. Mus. Aarb., 1911, No. 18, p. 10.	Granodiorite.	Calc. to 100 per cent?
119	I.4.2.4.⊙	Q 24.42 di 0.22 or 15.57 hy 0.10 ab 48.73 mt 1.62 an 8.06 hm 0.64	Risnesö, Sogn, Norway.	Landmark.	C. F. Kolderup, Berg. Mus. Aarb., 1911, No. 18, p. 7.	Granite.	Calc. to 100 per cent?
120	I.4.2''4.	Q 27.06 hy 2.50 or 11.12 mt 2.78 ab 40.87 an 15.01	Bremangerland, Sogn, Norway.	Landmark.	C. F. Kolderup, Berg. Mus. Aarb., 1911, No. 18, p. 13.	Granodiorite.	Calc. to 100 per cent?
121	I.4.2.4.⊙	Q 24.90 hy 1.70 or 15.57 mt 0.70 ab 44.01 il 0.30 an 11.12 C 0.10	Sulitelma, Norway.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 256, 1906.	Granite.	
122	I''4.''2.4.	Q 22.98 hy 4.20 or 18.35 mt 1.16 ab 41.92 il 0.30 an 6.39 hm 1.44 C 0.92	Sulitelma, Norway.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 256, 1906.	Granite.	
123	I.4(5).2''4''.	Q 13.08 hy 1.30 or 12.23 mt 0.93 ab 51.35 hm 1.76 an 18.35 C 0.51	Presten, Lofoten Islands, Norway.	T. Matthiesen.	C. F. Kolderup, Berg. Mus. Aarb., 1898, No. 7, p. 28.	Oligoclase rock.	In W. T., p. 179.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
124	75.05	13.66	0.62	1.11	0.46	1.82	4.78	2.84	0.36						100.70	
A3. III	1.251	.134	.004	.015	.012	.032	.077	.030								
125	68.19	16.88	1.63	n. d.	1.07	2.19	5.34	3.03	1.37				0.14		99.84	
A4. IV	1.137	.166	.010	(.020)	.027	.039	.085	.032					.002			
126	66.46	17.72	2.13	n. d.	0.95	3.44	4.96	2.86	1.50				0.13		100.15	
A4. IV	1.108	.173	.013	(.026)	.024	.061	.080	.030					.002			
127	72.69	14.49	0.75	1.59	0.94	1.79	4.95	1.74	none		0.17	0.61	none		99.72	
A2. II	1.212	.142	.005	.022	.024	.032	.080	.019			.002	.004	—			
128	69.81	15.39	1.12	2.14	0.83	2.32	5.33	1.97	0.64		0.48	0.09	0.06		100.18	
A2. II	1.164	.151	.007	.030	.021	.041	.085	.021			.006	—	.001			
129	69.61	15.00	0.75	2.81	1.11	2.38	4.77	2.45	0.55		0.42	0.15	0.27		100.27	
A2. II	1.160	.147	.005	.039	.023	.043	.077	.026			.005	.001	.004			
130	70.28	14.93	1.42	1.34	0.76	3.29	4.57	2.62	1.44				0.06	FeS ₂ 1.34	100.71	
A3. III	1.171	.146	.009	.043	.019	.059	.074	.027					—			
131	71.27	13.91	2.42	0.37	0.77	3.03	5.45	1.47	0.78						99.98	
A3. III	1.188	.136	.015	.005	.019	.054	.088	.016								
132	69.94	16.26	1.38	1.32	0.66	2.57	4.30	2.79	0.53	0.10	none	0.11		FeS ₂ 0.29	100.25	
A2. II	1.166	.159	.009	.018	.017	.046	.069	.030			—	.001				
133	69.73	15.97	1.27	1.23	0.68	3.28	5.30	1.76	0.53	none		0.21			99.96	2.677
A3. III	1.162	.156	.008	.017	.017	.059	.085	.019				.002				
134	68.15	15.94	1.30	1.98	1.30	2.39	4.60	2.73	0.27	0.04	0.48	0.29		CO ₂ 0.48 SO ₂ 0.31	100.26	
A2. II	1.136	.156	.008	.028	.033	.043	.074	.029			.006	.002				
135	68.04	17.46	0.71	1.53	0.99	2.40	5.44	2.88	0.16	0.12	0.11			FeS ₂ 0.11	99.95	
A3. III	1.134	.171	.004	.021	.025	.043	.088	.031			.001					
136	68.11	15.80	1.97	1.87	0.96	2.43	4.41	2.80	0.54	0.16	0.07	0.62		SO ₂ 0.13	99.87	2.665
A2. II	1.135	.155	.013	.027	.024	.043	.071	.030			.001	.004				
137	76.39	13.87	1.12	n. d.	0.12	2.04	4.18	3.25	0.11						101.08	
A4. IV	1.273	.136	.007	(.014)	.003	.037	.068	.035								
138	70.21	12.94	1.61	2.19	1.45	1.51	4.34	3.77	1.71		0.20	0.21		SO ₂ 0.11	100.25	2.675
A2. II	1.170	.127	.010	.030	.036	.027	.070	.040			.003	.002				
139	66.01	17.64	0.58	3.01	0.50	2.18	4.66	4.16	1.36				0.19		100.29	
A3. III	1.100	.173	.004	.042	.013	.039	.075	.045					.003			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENÖSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
124	I''4.2.4.	Q 31.62 di 1.14 or 16.68 hy 2.09 ab 40.35 mt 0.93 an 7.51	Harparboda, Linde, Sweden.	D. Hummel.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
125	I.4.2.4.⊙	Q 18.48 hy 5.60 or 17.79 ab 44.54 an 10.84 C 1.02	Various localities in Smaland, Sweden.	H. Santesson.	O. Nordenskjöld, B. Un. Ups., I, p. 177, 1894.	Quartz syenite porphyry.	Several speci- mens. In W. T., p. 181.
126	I.4''2(3).4.	Q 16.44 hy 6.10 or 16.68 ab 41.92 an 16.96 C 0.20	Sjögelö region, Smaland, Sweden.	H. Santesson.	O. Nordenskjöld, B. Un. Ups., I, p. 194, 1894.	Eorhyolite.	Several speci- mens. In W. T., p. 181.
127	I''(3)4.''2.4.	Q 32.46 hy 4.38 or 10.56 mt 1.16 ab 41.92 il 0.30 an 5.28 ap 1.34 C 2.45	Junka, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 15, p. 32, 1905.	Granite gneiss.	
128	I''4.2.4.	Q 21.48 hy 4.34 or 11.68 mt 1.62 ab 44.54 il 0.91 an 11.40 C 0.41	Haidus, Nystad, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 15, p. 42, 1905.	Granite.	
129	I(II).4.2.4.	Q 24.06 hy 7.16 or 14.46 mt 1.16 ab 40.35 il 0.76 an 11.12 ap 0.34 C 0.41	Palois, Idensalmi, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 15, p. 43, 1905.	Granite.	
130	I''4.2''4.	Q 25.92 di 3.19 or 15.01 hy 1.66 ab 38.78 mt 2.09 an 12.51	Lammersdorf, n. Aachen, Rhenish Prussia.	L. Schmitz.	Dannenberg and Holzapfel, Jb. Pr. G. L.-A., XVIII, p. 13, 1898.	Granite.	In W. T., p. 181.
131	I.4.2.4''.	Q 27.54 di 4.10 or 8.90 wo 0.35 ab 46.11 mt 1.16 an 8.90 hm 2.32	Hirschberg, n. Neutsch, Hesse.	Survey labora- tory.	C. Chelius, Erl. G. Kt. Hess., Bl. Rossdorf, p. 35, 1886.	Granite.	Not in W. T.
132	I.4.2''4.	Q 27.24 hy 2.89 or 16.68 mt 2.09 ab 36.15 an 12.79 C 1.43	Schenkenberg, Hesse.	Survey labora- tory.	C. Chelius, Erl. G. Kt. Hess., Bl. Lindenberg, p. 35, 1901.	Granite.	
133	I.4.2''4.	Q 24.48 hy 2.89 or 10.56 mt 1.86 ab 44.54 ap 0.67 an 14.46	Melibocus, Odenwald, Hesse.	R. Marzahn.	C. Chelius, Nbl. Ver. Erdk. (1), XIV, p. 2, 1893.	Granite.	In W. T., p. 181.
134	I''4.2.4.	Q 23.94 hy 5.15 or 16.12 mt 1.86 ab 38.77 il 0.91 an 10.01 ap 0.67 C 1.73	Ober Ramstadt, Bl. Rossdorf, Hesse.	G. Butzbach.	G. Klemm, Erl. G. Kt. Hess., Bl. Rossdorf, p. 58, 1912.	Granite porphyry.	
135	I.4.2.4.⊙	Q 17.58 hy 4.61 or 17.24 mt 0.93 ab 46.11 il 0.15 an 11.95 C 0.92	Rämster, n. Neutsch, Hesse.	Survey labora- tory.	C. Chelius, Erl. G. Kt. Hess., Bl. Neunkirchen, p. 13, 1901.	Granite.	
136	I''4.2.4.	Q 25.92 hy 4.12 or 16.68 mt 3.02 ab 37.20 il 0.15 an 8.34 ap 1.34 C 2.45	Mühlberg, Oden- wald, Hesse.	Survey labora- tory.	C. Chelius, Nbl. Ver. Erdk. (4), XIV, p. 2, 1893.	Granite.	In W. T., p. 181.
137	I.(3)4.2''4.	Q 34.08 di 0.96 or 19.46 hy 1.65 ab 35.63 an 9.17	Hechtsberg, Hansach, Schwarzwald, Baden.	H. Schwenkel.	H. Schwenkel, In. Diss. Tüb., p. 46, 1912.	Granulite (granite).	
138	I(II).4.(1)2.(3)4.	Q 22.50 di 0.68 or 22.24 hy 5.51 ab 36.68 mt 2.32 an 4.73 il 0.46 ap 0.67	Ehrenberg, n. Ilmenau, Thuringerwald.	Klüss.	R. Cronacher, In. Diss. Greifs., p. 41, 1909.	Granite.	
139	I.4''2.(3)4.	Q 14.88 hy 6.71 or 25.02 mt 0.93 ab 39.30 an 10.84 C 1.43	Lemberg, Pfalz, Bavaria.	A. Schwager.	M. Schuster, Geog. Jhft., XXVI, p. 249, 1914.	Quartz- biotite porphyrite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
140	68.95	16.13	2.53	0.99	0.42	1.29	5.36	3.28	1.29		0.30				100.54	2.659
A3. III	1.149	.158	.015	.014	.011	.023	.086	.035			.004					
141	63.32	15.51	3.53	3.44	0.65	3.64	4.16	3.14	0.46		1.16		0.18	CO ₂ 0.14 ZrO ₂ 0.07	99.40	2.736
B2. III	1.055	.152	.022	.048	.016	.065	.067	.033			.015		.003		(99.66)	
142	71.74	14.12	1.75	0.59	1.34	2.32	3.65	2.85	1.45						99.81	
A2. II	1.196	.138	.011	.008	.034	.041	.059	.031								
143	63.8	19.2	4.5	1.3	2.0	2.6	3.5	3.0	0.6						100.5	
B3. IV	1.063	.188	.028	.018	.050	.046	.056	.032								
144	65.06	17.04	1.49	2.80	0.94	3.60	4.76	4.19	0.60			0.09	trace	S 0.01	100.58	
A3. III	1.084	.167	.009	.039	.024	.064	.077	.044				—	—			
145	68.00	14.06	1.64	1.31	1.07	2.94	4.15	3.58	0.66	0.59	0.74	0.65	0.24	F 0.18	99.81	2.602
A2. II	1.133	.138	.010	.018	.027	.053	.067	.038			.009	.005	.003			
146	67.89	16.42	0.85	1.57	0.87	3.79	5.11	1.87	0.54		0.59	0.22	trace	ZrO ₂ 0.05 F 0.21 BaO 0.01	99.99	
A1. I	1.132	.161	.006	.022	.022	.068	.082	.020			.007	.002	—			
147	75.98	14.25	0.42	0.38	0.20	1.33	5.13	2.50	0.45				trace		100.64	
A3. III	1.286	.140	.003	.005	.005	.023	.082	.027					—			
148	72.87	14.01	0.14	1.09	0.04	1.83	4.55	3.63	1.14	0.50			trace		99.80	2.644
A3. III	1.215	.137	.001	.015	.001	.032	.074	.038					—			
149	65.62	15.64	2.86	1.16	1.29	3.34	4.20	3.83	1.09	0.14	0.79				99.96	2.712
A3. III	1.094	.153	.018	.016	.032	.060	.068	.040			.010				20°	
150	67.90	14.46	1.82	1.72	1.54	1.09	4.79	3.53	2.21	0.31	0.32				99.69	2.707
A3. III	1.132	.142	.011	.024	.039	.020	.077	.037			.004					
151	66.26	14.14	3.38	1.86	1.43	1.51	4.35	3.42	2.70	0.23	0.80				100.11	2.721
A3. III	1.104	.139	.021	.028	.036	.027	.070	.036			.010					
152	67.44	18.58	1.03	0.23	0.23	3.22	6.93	2.05	0.84		trace				100.55	2.65
A3. III	1.124	.182	.006	.003	.006	.057	.111	.022			—					
153	65.14	16.15	0.75	2.57	1.47	2.48	4.32	3.08	3.14	0.08	0.44	0.34			99.96	2.68
A2. II	1.086	.158	.005	.036	.037	.045	.069	.033			.006	.002				
154	71.57	16.91	0.47	0.78	0.46	1.22	5.56	3.79	0.29						101.05	2.60
B3. IV	1.193	.166	.003	.011	.012	.021	.090	.036								
155	68.13	14.59	2.04	2.33	1.28	2.70	3.47	3.05	0.85		0.51	0.02	trace		99.03	
B2. III	1.136	.143	.013	.032	.032	.048	.056	.033			.006					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
140	I.4.(1)2.4.	Q 21.96 hy 1.10 or 19.46 mt 2.32 ab 45.06 il 0.61 an 6.39 hm 0.80 C 1.43	Muhlenthal, n. Magdeburg, Prussia.	Bodländer.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 176, 1892.	Quartz porphyry.	In W. T., p. 181.
141	I(II).4.2''/4.	Q 18.48 di 3.00 or 18.35 hy 1.96 ab 55.11 mt 5.10 an 14.46 il 2.28	Breiterberg, Lüptitz, Saxony.	C. Ambronn.	C. Ambronn, In. Diss. Leip., p. 40, 1907.	Schliere in quartz porphyry.	Cf. No. 39, II.4.2.3.
142	I.(3)4.2''/4.	Q 32.40 hy 3.40 or 17.24 mt 1.86 ab 30.92 hm 0.48 an 11.40 C 0.71	Bärndorf, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 156, 1899.	Granitite.	In W. T., p. 181.
143	I(II).4.2''.(3)4.	Q 23.58 hy 5.00 or 17.79 mt 4.18 ab 29.34 hm 1.60 an 12.79 C 5.51	Kräherberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J., 1905, II, p. 18.	Quartz porphyry.	
144	I(II).4(5).2.(3)4.	Q 11.64 di 4.21 or 24.46 hy 3.94 ab 40.35 mt 2.09 an 12.79	Nassaberg, Eisengebirge, Bohemia.	C. von John.	von John and Hinterlechner, Jb. G. R.-A. Wien, LIX, p. 146, 1909.	Granitite.	
145	I.4.2.(3)4.	Q 24.30 di 0.65 or 21.13 hy 2.66 ab 35.11 mt 2.32 an 9.17 il 1.37 ap 1.68	Zalas, n. Cracow, Galicia.	Z. Rosen.	Z. Rosen, B. Ac. Sci. Crac., 1906, (2), p. 816.	Porphyry.	
146	I''4.2(3)4.	Q 22.26 hy 3.39 or 11.12 mt 1.39 ab 42.97 il 1.06 an 16.40 ap 1.01	Kosista, Tatra Mountains, Hungary.	W. Pawlizi.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Granite.	
147	I.(3)4.2.4.	Q 33.54 hy 0.76 or 15.01 mt 0.70 ab 42.97 an 6.39 C 0.82	Rotbach, Zillerthal, Tyrol.	W. Claar.	F. Becke, Ds. Ak. W. Wien, LXXV, (1), p. 170, 1913.	Aplite.	
148	I.4.''2.''4.	Q 28.26 di 1.73 or 21.13 hy 0.83 ab 38.77 mt 0.23 an 6.95	Renserspits, n. Maul, Tyrol.	G. Hradil.	G. Hradil, Sb. Ak. W. Wien, CXXI, p. 870, 1912.	Granite.	
149	I(II).4.2.(3)4.	Q 18.54 di 3.24 or 22.24 hy 1.70 ab 35.63 mt 1.39 an 12.61 il 1.52 hm 1.92	Habkernthal, n. Interlaken, Switzerland.	H. Hirschi.	H. Hirschi, In. Diss. Zür., p. 15, 1901.	Granite.	
150	I''4.(1)2.''4.	Q 21.60 hy 5.09 or 20.57 mt 2.55 ab 40.35 il 0.61 an 5.56 C 0.82	Ardez, Lower Engadine, Switzerland.	H. Hirschi.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 201, 1909.	Granite.	
151	I(II).4.2.''4.	Q 22.68 hy 3.60 or 20.02 mt 3.71 ab 36.68 il 1.52 an 7.51 hm 0.80 C 0.41	Suss Majur, Lower Engadine, Switzerland.	O. Züst.	O. Züst, In. Diss. Zür., p. 13, 1905.	Granite.	Also in U. Gruben- mann, Btr. G. Kt. Schw., XXIII, p. 201, 1909.
152	I.4(5).2.4''.	Q 12.84 di 1.30 or 12.23 wo 0.23 ab 58.16 mt 0.70 an 13.62 hm 0.48	Fiz Tgietschen, Ponteglia Gebiet, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com., 1913.	Aplite.	
153	I(II).4.2.''4.	Q 20.16 hy 7.00 or 18.35 mt 1.16 ab 36.15 il 0.91 an 10.56 ap 0.67 C 1.84	Tödi, Ponteglia Gebiet, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com., 1913.	Granite- syenite.	
154	I.4.(1)2.4.	Q 22.50 hy 2.26 or 20.02 mt 0.70 ab 47.16 an 5.84 C 1.94	Sella Bridge, St. Gotthard, Switzerland.	P. Waindziok.	P. Waindziok, In. Diss. Zür., p. 13, 1906.	Granite.	
155	I''.''4.2(3).(3)4.	Q 27.66 hy 4.92 or 18.35 mt 3.02 ab 29.34 il 0.91 an 13.34 C 0.61	Val di Rezzo, Valtellina, Lombardy.	M. Dittrich.	W. Rasch, N. J. B. B., XXXII, p. 203, 1911.	Tonalite- granite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
156	66.13	17.19	2.05	1.58	0.83	1.83	4.88	3.97	0.36		0.59	0.46			99.87	
A2. II	1.102	.168	.013	.022	.021	.032	.079	.042			.007	.003				
157	65.57	18.66	1.30	1.30	1.02	2.28	5.64	3.74	0.50		0.74	0.21			100.96	
A2. II	1.093	.183	.008	.018	.026	.041	.091	.040			.009	.001				
158	77.11	13.31	0.81	n. d.	0.21	1.32	4.39	3.21	0.37	0.05		0.07			100.85	2.659
A4. IV	1.285	.130	.005	(.010)	.005	.023	.071	.034			—					
159	76.28	14.22	trace	none	trace	1.19	4.95	3.90	0.24	0.08		trace			100.86	
A4. IV	1.271	.139	—	—	—	.021	.080	.041				—				
160	71.43	17.02	0.31	n. d.	0.25	3.19	5.31	2.52	0.40	0.25		0.26			100.94	2.642
B3. IV	1.191	.167	.002	(.004)	.006	.057	.085	.027				.002				
161	69.59	13.78	3.68	0.37	0.49	3.07	4.39	3.96	1.02		0.49		trace		100.84	
A3. III	1.160	.135	.023	.005	.012	.055	.071	.042			.006		—			
162	68.03	14.18	3.14	0.89	0.64	3.12	4.71	3.90	1.81		0.43		0.31		101.16	
B2. III	1.134	.139	.020	.013	.016	.055	.076	.041			.005		.004			
163	64.66	16.51	1.42	1.60	1.42	4.55	5.07	3.37	2.20		0.40				101.20	
B3. IV	1.078	.162	.009	.022	.036	.081	.082	.036			.005					
164	75.02	12.86	1.50	n. d.	0.95	1.05	5.01	2.28	0.90		trace				99.57	
A4. IV	1.250	.126	.009	(.018)	.021	.019	.080	.024			—					
165	69.71	16.51	1.50	n. d.	0.34	1.89	4.56	1.35	3.85						99.71	
A4. IV	1.162	.162	.009	(.018)	.008	.034	.073	.014								
166	65.97	17.50	2.17	n. d.	1.20	2.69	4.41	1.76	4.19						99.89	
A4. IV	1.100	.172	.014	(.028)	.030	.048	.071	.018								
167	74.48	15.45	none	none	trace	1.09	6.18	2.03	0.67						99.90	
A4. IV	1.271	.152	—	—	—	.020	.100	.021								
168	67.80	16.92	1.05	1.94	1.31	3.25	4.36	3.35	0.33				0.35		100.66	
A3. III	1.130	.166	.006	.027	.033	.058	.070	.036					.004			
169	63.80	15.62	0.72	2.31	1.15	3.32	5.47	3.26	3.59		1.04	0.19	0.11	Li ₂ O trace	100.58	
A2. II	1.063	.153	.004	.032	.029	.059	.089	.035			.013	.001	.002			
170	74.25	14.10	0.08	1.50	1.61	2.21	3.98	2.88	0.25		0.26	trace			101.12	
B3. IV	1.238	.138	.001	.021	.040	.039	.065	.031			.003	—				
171	69.75	14.70	0.65	2.48	1.42	3.43	4.79	3.07	none		0.45	trace			100.74	
A3. III	1.163	.144	.004	.035	.036	.061	.077	.033			.006				(100.54)	

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENÖSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
156	I.4.(1)2.(3)4.	Q 17.94 hy 2.36 or 23.35 mt 3.02 ab 41.39 il 1.06 an 6.12 ap 1.01 C 2.55	Near Monte Alto, Euganean Hills, Veneto, Italy.	M. Stark.	M. Stark, T. M. P. M., XXV, p. 323, 1906.	Plagioclase trachyte.	
157	I''4(5).2.4.	Q 12.24 hy 2.73 or 22.24 mt 1.86 ab 47.68 il 1.37 an 10.56 ap 0.34 C 1.43	Near Monte Alto, Euganean Hills, Veneto, Italy.	M. Stark.	M. Stark, T. M. P. M., XXV, p. 325, 1900.	Plagioclase trachyte.	
158	I.(3)4.2.''4.	Q 35.64 hy 1.82 or 18.90 ab 37.20 an 6.39 C 0.20	Monte Capanne, Elba, Italy.	G. d'Achiardi.	G. d'Achiardi, Mem. Soc. Tosc., XIX, p. 114, 1903.	Granite.	
159	I.4.(1)2.''4.	Q 30.36 wo 0.35 or 22.80 ab 41.92 an 5.00	S. Piero in Campo, Elba, Italy.	G. d'Achiardi.	G. d'Achiardi, Pr. Verb. Soc. Tosc., XIV, p. 127, 1904.	Aplitic granite.	
160	I.4.2.4.⊙	Q 24.54 hy 1.13 or 15.01 ap 0.67 ab 44.54 an 13.80 C 0.51	Crocetta, S. Piero in Campo, Elba, Italy.	E. Manasse.	E. Manasse, Pr. Verb. Soc. Tosc., XII, p. 220, 1901.	Granite (gneissoid).	
161	I(II)''2.(3)4.	Q 23.58 di 2.59 or 23.35 wo 2.32 ab 37.20 il 0.76 an 6.12 hm 3.68 ta 0.20	Near San Giorgio, Nurra, Sardinia.	F. Millosevich.	F. Millosevich, Mem. Ac. Linc. (5), VIII, No. 15, p. 610, 1911.	Trachydacite.	
162	I(II).4.''2.(3)4.	Q 20.34 di 3.46 or 22.80 wo 1.97 ab 39.82 mt 2.78 an 6.12 il 0.76 hm 1.28	Riu Manpu, Sassari, Sardinia.	F. Millosevich.	F. Millosevich, Mem. Ac. Linc., (5), VI, No. 14, p. 420, 1908.	Trachydacite.	
163	I(II).4(5).2.4.	Q 12.06 di 8.21 or 20.02 hy 0.73 ab 42.97 mt 2.09 an 12.23 il 0.76	Riu Mannu, Sassari, Sardinia.	F. Millosevich.	F. Millosevich, Mem. Ac. Linc., (5), VI, No. 14, p. 418, 1908.	Trachyan- desite.	
164	I.(3)4.''2.4.	Q 32.76 hy 4.78 or 13.34 ab 41.92 an 5.23 C 0.31	Mount Kastel, Crimea, Russia.	R. Prendel.	R. Prendel, Ref. N. J., 1887, II, p. 95.	Liparite.	In W. T., p. 181.
165	I.(3)4.2.4''.	Q 32.76 hy 3.19 or 7.78 ab 38.25 an 9.45 C 4.18	Alouchta, Crimea, Russia.	A. Lagorio.	A. Lagorio, VII Cong. G. Int., Guide, XXXIII, p. 27, 1897.	Keratophyre.	In W. T., p. 181.
166	I.4.2''4.	Q 24.72 hy 6.70 or 10.01 ab 37.20 an 13.34 C 3.57	Charkha, Crimea, Russia.	A. Lagorio.	A. Lagorio, VII, Cong. G. Int., Guide, XXXIII, p. 27, 1897.	Keratophyre.	In W. T., p. 181.
167	I.4.(1)2.4''.	Q 28.59 or 11.68 ab 52.40 an 5.56 C 1.12	Tumagor Kaja, Central Caucasus.	D. Beljankin.	L. Loewinson-Lessing, Mem. Russ. Min. Ges., XLII, p. 261, 1905.	Soda granite.	
168	I''4.2(3)''4.	Q 19.14 hy 6.73 or 20.02 mt 1.39 ab 36.68 an 16.12 C 0.20	Mount Elbruz, Caucasus.	A. Dannen- berg.	A. Dannenberg, T. M. P. M., XIX, p. 233, 1900.	Dacite.	Segregation in dacite. In W. T., p. 181.
169	I(II).4(5).2.4.	Q 11.28 di 6.15 or 19.46 hy 2.12 ab 46.63 mt 0.93 an 8.06 il 1.98 ap 0.34	Mount Elbruz, Caucasus.	A. Schwager.	L. V. Ammon, in G. Merzbacher, Kaukasus, II, p. 783, 1901.	Dacite.	
170	I''''4.2.''4.	Q 31.62 hy 6.24 or 17.24 mt 0.23 ab 34.06 il 0.46 an 10.84 C 0.31	Santorini, Aegean Sea.	Pisani.	A. Lacroix, C. R., CXL, p. 974, 1905.	Microtinite (andesite).	Inclusion in andesite.
171	I(II).4.2.4.	Q 20.82 di 6.18 or 18.35 hy 3.85 ab 40.35 mt 0.93 an 9.45 il 0.91	Santorini, Aegean Sea.	Pisani.	A. Lacroix, C. R., CXL, p. 974, 1905.	Andesite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC, TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
172	65.91	16.96	1.36	3.47	1.13	2.42	4.60	3.08	0.49	0.05	1.03	0.23			100.73	
A2. II	1.099	.166	.009	.048	.028	.043	.074	.033			.013	.002				
173	65.14	17.67	1.59	3.33	0.95	2.96	5.41	2.18	0.11	0.02	1.12	0.19			100.67	
A2. II	.086	.173	.010	.046	.024	.053	.087	.023			.014	.001				
174	67.50	15.51	0.73	2.94	1.29	1.30	4.86	4.02	0.88		0.99	0.08			100.10	
A2. II	1.125	.152	.005	.041	.032	.023	.078	.042			.012	—				
175	73.96	13.75	0.52	0.99	0.48	1.90	5.62	2.55	0.25		trace	0.17			100.19	
A3. III	1.233	.135	.003	.014	.012	.034	.090	.028			—	.001				
176	73.56	14.06	1.02	0.77	0.46	2.14	5.08	3.00	0.75			0.09			100.93	
A3. III	1.226	.138	.006	.011	.012	.038	.082	.032				—				
177	72.88	13.86	1.52	0.73	0.23	1.82	4.40	3.98	0.52				trace	CO ₂ trace	99.94	
A3. III	1.215	.136	.009	.010	.006	.032	.071	.042					—			
178	70.04	15.91	1.41	1.79	0.42	1.24	5.44	3.62	0.96			0.11	trace		100.94	
A3. III	1.167	.156	.009	.025	.011	.022	.088	.038				.001	—			
179	69.27	17.31	1.64	1.34	1.02	1.06	3.85	2.84	0.87			0.10	0.12	NiO 0.23 CuO 0.05	99.70	
A2. II	1.155	.170	.010	.018	.026	.019	.062	.030				.001	.002			
180	68.44	14.52	3.24	2.09	0.65	2.22	5.23	2.59	0.72				trace		99.70	2.67
A3. III	1.141	.142	.020	.029	.016	.039	.084	.028					—			
181	68.16	14.95	0.95	2.92	1.58	2.32	4.13	2.89	1.36	0.30	0.90	none	none	FeS ₂ 0.03	100.49	2.62
A2. II	1.136	.147	.006	.040	.040	.041	.066	.031			.011	—	—			
182	76.19	13.42	0.41	n. d.	trace	1.35	4.57	2.63	1.15						99.72	
A4. IV	1.270	.131	.003	(.006)	—	.024	.074	.028								
183	63.74	16.61	2.76	1.39	1.60	4.57	4.87	2.53	1.03		0.58				99.68	
A3. III	1.062	.163	.017	.019	.040	.082	.079	.027			.007					
184	72.55	14.13	0.65	1.79	none	3.53	4.47	2.71	0.37			trace			100.20	
A3. III	1.209	.138	.004	.025	—	.063	.073	.029				—				
185	72.55	13.40	0.60	2.02	0.51	2.65	3.62	2.98	0.65	0.20	0.40	0.18	0.33	ZrO ₂ 0.07 S 0.11	100.27	2.642
A1. I	1.209	.131	.004	.028	.013	.047	.058	.032			.005	.001	.005			
186	71.80	15.11	0.28	2.03	0.20	2.27	3.24	2.93	1.09		0.34	0.24	0.18	ZrO ₂ 0.02 S 0.05	99.78	
A1. I	1.197	.148	.002	.028	.005	.041	.052	.031			.004	.002	.003			
187	65.59	17.24	3.46	0.56	1.27	3.57	4.72	1.78	0.54		0.51	0.44	0.30	S 0.10	100.08	
A2. II	1.093	.169	.022	.008	.032	.064	.076	.019			.006	.003	.004			
188	72.44	16.51	0.24	0.52	0.05	2.47	4.54	2.13	1.13	0.13	trace				100.16	
A3. III	1.207	.162	.002	.007	.001	.045	.073	.022			—					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 4. DOSODIC. LASSENÖSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
172	I(II).4.2.4.	Q 19.86 hy 6.23 or 18.35 mt 2.09 ab 38.77 il 1.98 an 10.01 ap 0.67 C 2.35	Therassia, Santorini, Aegean Sea.	H. S. Washing- ton.	H. S. Washington, XII, Cong. G. Int., C. R., p. 235, 1913.	Andesite.	
173	I''4''2''4.	Q 16.88 hy 5.30 or 12.79 mt 2.32 ab 45.59 il 2.13 an 13.90 ap 0.34 C 1.33	Palaio Kaimeni, (A. D. 46), Santorini, Aegean Sea.	H. S. Washing- ton.	H. S. Washington, XII, Cong. G. Int., C. R., p. 235, 1913.	Andesite.	
174	I(II).4.''2.(3)4.	Q 18.18 hy 6.37 or 23.35 mt 1.16 ab 40.87 il 1.82 an 6.39 C 0.92	Kilometre 171, Konakry-Niger R. R., French Guinea.	Not stated.	Col. Azema, C. R. Cong. Soc. Sav., p. 161, 1912.	Granite.	
175	I.4.(1)2.4.	Q 27.24 di 3.25 or 15.57 hy 1.03 ab 47.16 mt 0.70 an 4.73 ap 0.34	Cheren, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 56, 1909.	Granite.	
176	I.4.''2.4.	Q 27.78 di 3.16 or 17.79 hy 0.33 ab 42.97 mt 1.39 an 6.67	Aratu, Mai Adarté, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 89, 1909.	Granite porphyry.	
177	I.4.''2.(3)4.	Q 28.50 di 1.54 or 23.35 wo 0.23 ab 37.20 mt 2.09 an 6.39	Samoite, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 117, 1909.	Felsoliparite.	
178	I.4.(1)2.4.	Q 20.76 hy 3.21 or 21.13 mt 2.09 ab 46.11 ap 0.34 an 5.28 C 1.12	Adi Saeli, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 70, 1909.	Adamellite.	
179	I''(3)4.(1)2.''4.	Q 32.10 hy 3.92 or 16.68 mt 2.32 ab 32.49 ap 0.34 an 4.45 C 6.32	Werkh Issetsk, Mursinsk, Perm, Russia.	G. Katerfeld.	W. Nikitin, Mem. C. G. Russ., XXII, p. 95, 1907.	Granite.	Should be on p. 239.
180	I''4.2.4.	Q 22.44 di 2.04 or 15.57 hy 1.92 ab 44.01 mt 4.64 an 8.34	Marekanka River, n. Okhotsk, Siberia.	Y. F. Gervé.	K. E. Bugdanovitch, Fund. Marek., p. 14, 1904?	Quartz kerato- pyre.	
181	I(II).4.2.''4.	Q 24.54 hy 7.04 or 17.24 mt 1.39 ab 34.58 il 1.67 an 11.40 C 0.92	Zeia River, Amur District, Siberia.	W. Giers.	E. Ahnert, Expl. G. Reg. Aurif. Sib., X, Taf. VII, 1910.	Aplite.	
182	I.(3)4.2.4.	Q 35.76 hy 0.84 or 15.57 ab 38.78 an 7.78 C 0.51	Unga Island, Kamchatka.	P. Wenjukoff.	P. Wenjukoff, Ref. N. J., 1891, I, p. 281.	Liparite obsidian.	In W. T., p. 181.
183	I(II).4''2(3).4.	Q 14.82 di 5.40 or 15.01 hy 1.50 ab 41.39 mt 2.73 an 15.85 il 1.06 hm 0.80	Kara Kösül, Thian Shan Mountains, Turkestan.	C. Pfeil.	K. Futterer, Durch Asien, II, (1), p. 180, 1905.	Granite.	Al ₂ O ₃ corrected as in III, (4), p. 23.
184	I''4.2.4.⊙	Q 28.62 di 5.21 or 16.12 wo 0.70 ab 38.25 mt 0.93 an 10.01	Okura, Fukai Island, Goto Islands, Japan..	K. Yokoyama.	S. Kozu, pers. com., 1913.	Adamellite porphyry.	
185	I''4.2''(3)4.	Q 32.82 di 0.71 or 17.79 hy 4.10 ab 30.39 mt 0.93 an 11.40 il 0.76 ap 0.34	Manzeisan, Ono, Bizen, Japan.	N. Yoshioka.	S. Kozu, pers. com., 1913.	Granite.	
186	I.(3)4.2.(3)4.	Q 36.06 hy 3.80 or 17.24 mt 0.46 ab 27.25 il 0.61 an 9.45 ap 0.67 C 3.16	Kobata, Makabé, Hitachi, Japan.	T. Ohashi.	S. Kozu, pers. com., 1913.	Granite.	
187	I''4.2(3).4.	Q 22.98 hy 3.20 or 10.56 mt 1.39 ab 39.82 il 0.91 an 15.01 hm 2.56 C 2.04 ap 1.01	Sambe Volcano, Iwami, Japan.	C. Sugiura.	S. Kozu, pers. com., 1913.	Dacite.	
188	I''4.2''4.	Q 32.46 hy 0.76 or 12.23 mt 0.46 ab 38.25 an 12.51 C 2.24	Bookit Kelam, Central Borneo.	M. Dittrich.	J. Schmutzer, Vh. Ac. Wet. Amst., 1908, p. 413.	Microgranite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
189	71.20	16.12	1.69	n. d.	1.63	1.36	5.72	1.37	1.48	0.22	trace		trace		100.79	2.57	
A4. IV	1.187	.138	.011	(.022)	.041	.024	.092	.015			—		—				
190	68.06	15.03	0.28	3.66	0.81	2.71	4.25	3.41	2.12		0.38		trace		100.71		
A3. III	1.134	.147	.002	.051	.020	.048	.069	.036			.005		—				
191	66.26	16.31	3.38	1.36	1.66	2.88	4.11	2.23	n. d.		0.66		0.38	CaSO ₄ 0.62	99.85	2.438	
A2. II	1.104	.160	.021	.019	.042	.052	.066	.023			.008		.005				
192	69.44	15.21	1.74	0.56	0.93	1.99	5.11	4.53	0.77						100.28		
A3. III	1.157	.149	.011	.008	.021	.036	.082	.048									
193	71.16	16.19	0.36	0.68	0.60	1.77	4.73	2.03	2.17	0.22	0.11	trace	trace	SO ₂ Cl	trace trace	100.02	2.665
A3. III	1.186	.159	.002	.009	.015	.032	.076	.021			.001	—	—				
194	67.39	15.22	1.08	3.36	1.49	3.24	4.44	3.33	0.49	0.09	0.48	0.28		CO ₂ 0.11	101.00		
B2. III	1.123	.149	.007	.047	.037	.058	.072	.035			.006	.002					
195	72.77	13.87	trace	2.79	0.40	1.60	4.18	2.81	0.29	0.02	0.55		0.22	S	trace	99.74	2.69
A2. II	1.213	.136	—	.039	.010	.029	.068	.030			.007		.003				
196	72.70	13.85	2.50	n. d.	0.94	3.34	4.60	2.46	n. d.			trace	trace		100.39		
A4. IV	1.212	.136	.016	(.032)	.024	.059	.074	.026				—	—				
197	71.29	15.70	1.50	0.30	0.89	3.41	4.81	2.35	0.07				trace		100.32		
A3. III	1.188	.154	.009	.004	.022	.055	.077	.025					—				
198	63.60	15.84	1.45	2.72	1.14	3.03	4.33	3.26	3.88	0.30	0.70	0.10	trace	CO ₂ Cl S Cr ₂ O ₃ BaO SrO Li ₂ O	none trace trace none none none	100.35	2.51
A1. I	1.060	.155	.009	.038	.029	.054	.069	.035			.009	.001	—				
199	65.52	14.80	5.72	2.83	0.16	1.10	4.92	3.23	1.76		0.56				100.60		
A3. III	1.092	.145	.036	.039	.004	.020	.079	.034			.007						
200	65.12	16.70	4.00	1.03	0.28	1.25	5.69	3.24	2.54		0.80				100.65		
A3. III	1.085	.164	.025	.014	.007	.022	.092	.034			.010						
201	68.00	17.28	0.07	3.56	0.37	1.67	4.08	3.59	0.46	0.23	0.16	trace	0.05	CO ₂ 0.27	99.79		
A2. II	1.133	.169	—	.050	.009	.030	.066	.038			.002	—	—				
202	67.71	14.65	1.59	3.29	0.85	2.34	6.09	1.99	0.16		1.00	0.16			99.83		
A2. II	1.129	.142	.010	.046	.021	.042	.098	.021			.013	.001					
203	63.5	17.2	2.7	1.9	1.1	3.0	5.5	3.2	1.7		0.7				100.05		
B3. IV	1.058	.169	.017	.026	.028	.054	.089	.034			.009						

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. LASSENÖSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
189	I''4.''2.4(5).	Q 26.04 hy 7.00 or 8.34 ab 48.21 an 6.67 C 2.75	Kali Soeroean, Loh-oelo, Java.	N. Sahlbom.	G. Niethammer, T. M. P. M., XXVIII, p. 221, 1909.	Dacite.	
190	I(II).4.2.(3)4.	Q 21.00 di 1.43 or 20.02 hy 7.08 ab 36.15 mt 0.46 an 11.68 il 0.76	Eruption of 1883, Krakatoa.	A. Schwager.	K. Oebbeke, N. J., 1884, II, p. 83.	Andesite ash.	In W. T., p. 429.
191	I(II).4.2(3).4	Q 25.44 hy 4.20 or 12.79 mt 3.71 ab 31.58 il 1.22 an 14.46 hm 0.80 C 1.94	Eruption of 1883, Krakatoa.	C. Winkler.	R. D. M. Verbeek, Krakatau, p. 292, 1884.	Andesite ash.	In W. T., p. 429.
192	I''4.(1)2.(3)4.	Q 17.94 di 3.67 or 26.68 hy 0.60 ab 42.97 mt 1.86 an 5.28 hm 0.48	Porobbo, Toba Lake, Sumatra.	W. Herz.	L. Milch, Z. D. G. G., LI, p. 69, 1899.	Quartz trachyte- andesite.	In W. T., p. 181.
193	I''4.2.4.	Q 31.14 hy 2.29 or 11.68 mt 0.46 ab 39.82 il 0.15 an 8.90 C 3.06	Stawell, Victoria.	Not stated.	A. R. Sec. Mines Vict., (1907), p. 63, 1908.	Feldspathic dike rock.	
194	I(II).4.2.''4.	Q 19.02 di 2.07 or 19.46 hy 7.16 ab 37.73 mt 1.62 an 11.68 il 0.91 ap 0.67	Tingha, New South Wales.	E. Hamilton.	W. N. Benson, pers. com.	Granite.	
195	I''.''4.2.4.	Q 31.32 hy 5.62 or 16.68 il 1.06 ab 35.63 an 8.06 C 0.92	Duffers Creek, Pilbara, West Australia.	J. H. Brooking.	A. G. Maitland, West Aust. G. S. B. 15, p. 12, 1904.	Porphyry.	
196	I''4.2.4.	Q 27.66 di 5.39 or 14.46 hy 3.91 ab 38.78 an 10.01	Lyttleton, Banks Peninsula, New Zealand.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., XXVI, p. 379, 1894.	Tridymite trachyte.	In W. T., p. 183.
197	I4.2.''4.	Q 26.82 di 0.65 or 13.90 hy 1.90 ab 40.35 mt 0.93 an 14.46 hm 0.80	Lyttleton, Banks Peninsula, New Zealand.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., XXVI, p. 379, 1894.	Tridymite trachyte.	In W. T., p. 183.
198	I(II).4.2''.''4.	Q 17.10 hy 5.54 or 19.46 mt 2.09 ab 36.15 il 1.37 an 14.18 ap 0.34	Leleppa Island, New Hebrides.	D. Mawson.	D. Mawson, Pr. Linn. Soc. N. S. W., XXX, p. 470, 1905.	Andesite.	
199	I(II).4.(1)2.4.	Q 22.20 hy 0.40 or 18.90 mt 7.42 ab 41.39 il 1.06 an 5.56 hm 0.64 C 1.22	Perseverance Harbor, Campbell Island.	P. Marshall.	P. Marshall, Subant. Islds., II, p. 695, 1909.	Phonolite.	
200	I''4''.(1)2.4.	Q 16.68 hy 0.70 or 18.90 mt 0.93 ab 48.21 il 1.52 an 6.12 hm 3.36 C 1.63	Garden Cove, Campbell Island.	P. Marshall.	P. Marshall, Subant. Islds., II, p. 691, 1909.	Porphyry.	
201	I''4.2.(3)4.	Q 23.52 hy 7.24 or 21.13 il 0.30 ab 34.58 an 8.34 C 3.57	Cape Royds, Ross Region, Antarctica.	Burrows and Walkom.	J. W. E. David, pers. com.	Not named.	
202	I(II).4.''2.4''.	Q 18.54 di 3.72 or 11.68 hy 3.28 ab 51.35 mt 2.32 an 6.39 il 1.98 ap 0.34	Deception Island, South Shetland Islands, Antarctica.	Boiteau.	E. Gourdon, pers. com., 1913.	Trachyte.	
203	I''4(5).2.4.	Q 11.52 di 1.73 or 18.90 hy 2.00 ab 46.63 mt 3.94 an 12.79 il 1.37	Wandel Island, Graham Land, Antarctica.	Pisani.	E. Gourdon, C. R., CXLIII, p. 179, 1906.	Trachyan- desite.	Also in Exp. Ant. Fr., Pet. vol., p. 166, 1908.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. TOSCANASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	65.41	16.09	3.84	0.95	1.51	2.93	6.54	0.57	1.06	0.13	0.51		0.20	CO ₂ 0.47	100.21	
A2. II	1.090	.158	.024	.014	.038	.052	.105	.006			.006		.003		(100.01)	
2	69.10	15.05	0.74	2.81	1.63	2.86	4.92	0.89	1.76	0.07	0.26	0.24	0.12	CO ₂ trace ZrO ₂ trace S 0.08 BaO 0.02	100.55	
A1. I	1.152	.148	.005	.039	.041	.051	.079	.010			.003	.002	.002			
3	70.38	16.32	0.50	0.75	0.60	3.09	6.31	0.03	1.33	0.04	0.14	trace	0.08	S trace	99.57	
A2. II	1.173	.160	.003	.010	.015	.055	.102	—			.002	—	.001			
4	68.00	16.33	0.26	0.70	1.41	5.90	6.20	0.38	0.25	0.06	0.43	0.22	0.02	ZrO ₂ 0.02 Cl 0.13 F 0.07 S 0.01 Cr ₂ O ₃ none BaO 0.03 SrO 0.03	100.45	
A1. I	1.133	.160	.002	.010	.035	.105	.100	.004			.005	.002	—			
5	74.21	14.47	0.35	0.50	0.28	1.71	7.62	0.10	0.23	0.15	0.30	0.07	none	BaO none SrO trace Li ₂ O trace	99.99	
A2. II	1.236	.142	.002	.007	.007	.030	.122	.001			.004	—	—			
6	67.88	17.21	2.00	1.62	1.52	3.08	5.71	0.26	0.45		0.20	0.10	0.09	CO ₂ none ZrO ₂ trace Cl trace	100.12	
A2. II	1.131	.169	.013	.022	.038	.055	.092	.003			.003	.001	.001			
7	67.62	17.03	1.30	1.71	1.51	3.11	5.86	0.63	0.50	0.34	0.34	0.01	trace	CO ₂ 0.10 S trace	99.72	2.684
A2. II	1.127	.167	.008	.024	.038	.055	.094	.007		.004	.004	—	—			
8	63.75	16.30	4.90	1.45	1.30	4.08	6.00	0.92	1.25						99.95	
A3. III	1.063	.160	.031	.020	.033	.073	.097	.010								
9	72.56	15.13	2.54	n. d.	0.95	2.01	5.06	0.56	0.03	0.93	trace	none	0.46		100.23	
A4. IV	1.209	.148	.016	(.032)	.024	.036	.082	.006			—	—	.007			

RANG 3. ALKALICALCIC. COLORADASE. (C. I. P. W., 1902.)

1	67.93	16.28	2.85	1.38	0.90	2.81	1.80	5.02	0.53		0.30		0.07		99.87	
A2. II	1.132	.160	.018	.019	.023	.050	.029	.053			.004		.001			
2	68.95	15.58	2.52	1.30	0.80	3.07	1.59	4.79	0.81	0.34	0.40	0.20	0.04	CO ₂ none	100.39	
A2. II	1.149	.153	.016	.018	.020	.055	.026	.051			.005	.001	—			

RANG 3. ALKALICALCIC. COLORADASE.

1	65.13	15.50	1.77	4.17	0.54	3.98	2.70	4.53	0.26		1.12	0.06	trace	FeS ₂ 0.62	100.38	
A2. II	1.086	.152	.011	.058	.014	.071	.044	.048			.014	—	—			
2	68.40	16.34	0.17	1.56	0.64	3.77	3.39	3.91	0.55	0.29	0.29	0.22	0.07	CO ₂ none ZrO ₂ none S none BaO 0.15 SrO 0.05	99.80	
A1. I	1.140	.160	.001	.022	.016	.068	.055	.041			.004	.002	.001			
3	64.45	17.69	1.33	1.93	0.57	3.73	3.85	3.68	0.80	0.59	0.69	0.16	0.05	S 0.04 BaO 0.19	100.04	
A1. I	1.074	.173	.008	.027	.014	.066	.062	.039			.009	.001	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 5. PERSODIC. MARIPOSOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I(II).4.2.5.	Q 17.04 di 1.08 or 3.34 hy 3.60 ab 53.02 mt 1.86 an 13.07 il 0.91 hm 2.56	Hyde Park Tunnel, Neponset Valley, Massachusetts.	W. T. Hall.	F. Bascom, J. Ac. N. Sci. Phila., (2), XV, p. 150, 1912.	Soda trachyte.	
2	I(II).''4.2''.(4)5.	Q 27.36 hy 8.46 or 5.56 mt 1.16 ab 41.39 il 0.46 an 12.23 ap 0.67 C 1.53	Aldham, Pennsylvania.	W. T. Schaller.	F. Bascom, U. S. G. S. rec. lab.	Quartz norite gneiss.	
3	I.4.2(3).5.	Q 25.86 hy 2.16 ab 53.45 mt 0.70 an 15.29 il 0.30 C 0.31	Benning Mine, Dahlonega, Georgia.	E. Everhardt.	S. P. Jones, Ga. G. S. B. 19, p. 74, 1909.	Granite.	
4	I(II).4.2(3).5.	Q 19.02 di 8.31 or 2.22 wo 0.46 ab 52.40 mt 0.46 an 15.57 il 0.76 ap 0.67	Rumsey Mountain, Philipsburg quadrangle, Montana.	W. F. Hille- brand.	Emmons and Calkins, U. S. G. S. P. P. 78, p. 124, 1913.	Pyroxene aplite.	
5	I.4.(1)2.5.	Q 26.46 di 1.76 or 0.56 wo 0.35 ab 63.93 mt 0.46 an 5.28 il 0.61	Near Mariposa, Mariposa County, California.	W. F. Hille- brand.	H. W. Turner, J. G., III, p. 403, 1895.	Aplite.	Also in U. S. G. S. A. R. 17, I, p. 721, 1896. In W. T., p. 183.
6	I.4.2(3).5.	Q 24.36 hy 4.72 or 1.67 mt 3.02 ab 48.21 il 0.46 an 14.46 ap 0.34 C 2.24	Towakaima Falls, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., II, p. 10, 1898.	Granite.	Also in G. Goldf. Br. Gui., p. 76, 1908. In W. T., p. 183.
7	I''4.2''.'5.	Q 21.66 hy 5.38 or 3.89 mt 1.86 ab 49.26 il 0.61 an 15.29 C 1.12	Essequibo, etc., rivers, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 52, 1900.	Granophyre.	Average sample. In W. T., p. 183.
8	I(II).4''2''.'5.	Q 15.72 di 4.32 or 5.56 hy 1.30 ab 50.83 mt 4.64 an 14.73 hm 1.76	Vrhnik, Bachergebirge, Styria.	B. Trobei.	B. Trobei, Mt. Nw. Ver. Steierm., XLIV, p. 189, (1907), 1908.	Granite porphyry.	
9	I''.(3)4.2.'5.	Q 32.76 hy 7.55 or 3.34 ab 42.97 an 10.01 C 2.45	Ilocos Norte, Luzon, Philippine Islands.	L. A. Salinger.	W. D. Smith, Phil. J. Sci., (A), II, p. 152, 1907.	Granite.	

SUBBRANG 2. DOPOTASSIC.

1	I''.(3)4.(2)3.2(3).	Q 31.02 hy 2.30 or 29.47 mt 3.71 ab 15.20 il 0.61 an 13.90 hm 0.32 C 2.86	Grafversfors, Stafrsjö, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
2	I.(3)4.(2)3.2''.	Q 33.78 hy 2.00 or 28.36 mt 3.02 ab 13.62 il 0.76 an 14.46 hm 0.48 C 2.45 ap 0.34	Papamoa, Te Puke District, New Zealand.	Not stated.	J. A. Bartrum, N. Z. Mines Statem., (1912), p. 140, 1913.	Rhyolite.	

SUBBRANG 3. SODIPOTASSIC. AMIATOSE. (C. I. P. W., 1902.)

1	I(II).4.(2)3.3.	Q 21.36 di 2.64 or 26.69 hy 4.40 ab 23.06 mt 2.55 an 16.68 il 2.13	Cape Camperdown, Bache Peninsula, Ellsmere Land.	P. Schei.	C. Bugge, Rep. 2nd Fram Exp., No. 22, p. 18, 1910.	Quartz syenite.	
2	I.4.(2)3.3''.	Q 24.48 hy 3.98 or 22.80 mt 0.23 ab 28.82 il 0.61 an 16.96 ap 0.67 C 0.31	Royal Mine, Philipsburg quadrangle, Montana.	G. Steiger.	Emmons and Calkins, U. S. G. S. P. P. 78, p. 109, 1913.	Quartz monzonite.	
3	I''4.(2)3.3(4).	Q 19.08 hy 2.72 or 21.68 mt 1.86 ab 32.49 il 1.37 an 17.51 ap 0.84 C 0.92	Thunderbolt, Montana.	J. G. Fairchild.	A. Knopf, U. S. G. S. rec. lab.	Latite.	

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
4	64.31	15.44	2.43	2.58	2.21	4.22	2.71	4.09	0.79	0.19	0.71	0.22	trace	S Cr ₂ O ₃ NiO BaO SrO Li ₂ O	trace none none 0.07 trace trace	99.97	
A1. I	1.072	.151	.015	.036	.044	.075	.044	.044			.009	.002	—				
5	64.05	15.38	2.20	2.74	2.03	4.30	2.74	4.00	0.83	0.27	0.60	0.21	0.11	CO ₂ S BaO SrO Cu	0.35 0.07 0.08 0.04 0.005	100.06	
A1. I	1.068	.150	.014	.038	.052	.077	.044	.042			.007	.001	.002				
6	62.53	19.01	1.96	1.44	1.29	5.17	3.45	3.30	0.45	0.21	0.65	0.17	0.03	CO ₂ SO ₃ BaO SrO Li ₂ O	none none 0.13 0.04 trace	99.83	
A1. I	1.042	.186	.013	.020	.032	.083	.056	.035			.008	.001	—				
7	67.53	15.46	2.18	2.42	0.16	3.24	3.24	3.86	0.55	0.23	0.41	0.01	0.10	CO ₂ ZrO ₂ F FeS ₂ Cr ₂ O ₃ NiO BaO SrO	0.03 0.02 0.03 0.09 none none 0.07 none	99.63	
A1. I	1.126	.152	.014	.033	.004	.058	.052	.041			.005	—	.001				
8	64.28	16.99	2.59	2.64	1.13	3.95	3.78	3.51	0.25	0.07	0.49	0.32	0.14	CO ₂ ZrO ₂ F S V ₂ O ₅ NiO BaO SrO Li ₂ O	none 0.01 0.06 none 0.03 none 0.10 0.04 none	100.38	
A1. I	1.071	.167	.016	.037	.028	.071	.061	.037			.006	.002	.002				
9	65.36	15.46	3.09	1.21	1.53	4.14	3.58	3.41	0.70	0.82	0.52	0.25	0.19	BaO	0.08	100.36	
A2. II	1.089	.152	.019	.017	.038	.074	.058	.036			.007	.002	.003				
10	61.42	17.69	4.24	1.74	1.81	5.29	3.14	3.19	0.97		0.37	0.14	0.19	BaO	0.09	100.28	
A2. II	1.024	.173	.027	.025	.045	.095	.050	.034			.005	.001	.003				
11	63.91	17.07	4.39	1.51	0.81	4.47	3.48	3.74	0.33			0.21				99.92	2.751
A3. III	1.065	.168	.028	.021	.020	.080	.056	.039				.002					14°
12	62.09	16.77	3.96	0.98	1.63	4.26	3.77	3.68	1.32	0.50	0.73	0.25	0.14	ZrO ₂ S BaO SrO Li ₂ O	trace none 0.10 0.05 trace	100.24	
A1. I	1.035	.164	.025	.014	.041	.076	.061	.039			.009	.002	.002				
13	63.03	15.86	3.31	1.74	1.69	4.40	3.17	3.75	1.73	0.43	0.64	0.24	0.10	ZrO SO ₃ BaO SrO	none none 0.08 0.03	100.20	
A1. I	1.051	.153	.021	.024	.042	.079	.052	.040			.008	.002	.001				
14	62.64	17.46	3.35	1.03	1.05	4.32	3.97	3.94	0.56	0.84	0.69	0.26	0.09	CO ₂ ZrO ₂ S Cr ₂ O ₃ V ₂ O ₅ BaO SrO	none 0.02 0.02 none 0.03 0.10 0.06	100.43	
A1. I	1.044	.171	.021	.014	.026	.078	.065	.041			.009	.002	.001				
15	62.60	18.16	0.91	2.72	0.96	5.30	3.02	4.10	0.34	0.28	1.02	0.06	0.50	ZrO ₂ Cl	trace 0.04	100.01	
A2. II	1.043	.178	.006	.038	.021	.095	.048	.044			.013	—	.007				
16	64.41	15.85	1.92	2.52	1.66	3.71	3.60	3.46	1.09	0.12	0.43	0.23	0.07	CO ₂ SO ₃	0.72 none	99.79	2.64
A2. II	1.074	.155	.012	.035	.042	.063	.058	.037			.005	.002	.001				
17	58.04	18.96	5.88	1.33	1.11	6.12	2.26	4.08	2.05			0.34		BaO	0.04	100.21	
A3. III	.967	.186	.037	.018	.028	.109	.036	.043				.002					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 8. SODIOPOTASSIC. AMIATOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
4	I(II).4."3.3.	Q 21.54 di 0.68 or 24.46 hy 5.65 ab 23.06 mt 3.48 an 17.51 il 1.37 ap 0.67	Elkhorn, Montana.	H. N. Stokes.	J. S. Barrell, U. S. G. S. A. R. 21, II, p. 536, 1901.	Quartz monzonite.	
5	I(II).4.3.3.	Q 20.04 hy 7.58 or 23.35 mt 3.25 ab 23.06 il 1.22 an 20.57 ap 0.34	Gagnon Mine, Butte, Montana.	H. N. Stokes.	Weed and Tower, U. S. G. S. P. P. 74, p. 33, 1912.	Quartz monzonite.	Also in H. W. Weed, J. G., VII, p. 739, 1899. In W. T., p. 183.
6	I".4.3.3(4).	Q 17.04 hy 3.20 or 19.46 mt 3.02 ab 23.34 il 1.06 an 25.02 ap 0.34	Hiawatha Creek, Butte District, Montana.	H. N. Stokes.	Weed and Tower, U. S. G. S. B. 168, p. 119, 1900.	Andesite porphyry.	In W. T., p. 183.
7	I.4.(2)3.3.	Q 25.98 hy 2.38 or 22.80 mt 3.25 ab 27.25 il 0.76 an 16.12	Brewery Hill, Breckenridge District, Colorado.	R. C. Wells.	F. L. Ransome, U. S. G. S. P. P. 75, p. 45, 1911.	Quartz monzonite porphyry.	
8	I(II).4.(2)3.3(4).	Q 18.60 hy 5.04 or 20.57 mt 3.71 ab 31.96 il 0.91 an 17.79 ap 0.67 C 0.51	Mount Guyot, Breckenridge District, Colorado.	R. C. Wells.	F. L. Ransome, U. S. G. S. P. P. 75, p. 58, 1911.	Quartz monzonite porphyry.	
9	I".4.(2)3.3(4).	Q 21.72 di 1.94 or 20.02 hy 2.90 ab 30.39 mt 3.02 an 16.12 il 1.06 hm 0.96 ap 0.67	Mount Carbon, West Elk Moun- tains, Colorado.	T. M. Chatard.	W. Cross, U. S. G. S. A. R. 14, p. 227, 1894.	Quartz porphyrite.	In W. T., p. 183.
10	I(II).4.3.3".	Q 17.64 di 0.65 or 18.90 hy 4.20 ab 26.20 mt 5.34 an 24.74 il 0.76 hm 0.64 ap 0.34	Storm Ridge, West Elk Mountains, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 14, p. 227, 1894.	Porphyrite.	In W. T., p. 189.
11	I".4."3.3".	Q 19.74 hy 2.00 or 21.68 mt 4.87 ab 29.34 hm 1.12 an 20.29 ap 0.67	Sultan Mountain, Silverton quad- rangle, San Juan County, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 21, II, p. 82, 1900.	Quartz monzonite.	Also in U. S. G. S. Fol. 120, p. 12, 1905. In W. T., p. 183.
12	I(II).4".(2)3.3(4).	Q 15.54 di 1.08 or 21.68 hy 3.80 ab 31.96 mt 1.16 an 17.79 il 1.37 hm 3.20 ap 0.67	Pole Creek, Silver- ton, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. Fol. 120, p. 8, 1905.	Quartz latite.	
13	I(II).4.(2)3.3".	Q 19.32 di 1.94 or 22.24 hy 3.50 ab 27.25 mt 3.94 an 17.51 il 1.22 hm 0.64 ap 0.67	Falls Creek, Lake City quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. B. 419, p. 118, 1910.	Andesite.	
14	I".4".(2)3.3(4).	Q 14.76 di 1.30 or 22.80 hy 2.00 ab 34.06 mt 1.39 an 18.07 il 1.37 hm 2.40 ap 0.67	Trout Creek, San Cristobal quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. rec. lab.	Quartz latite.	
15	I(II).4".3.3.	Q 15.60 di 2.10 or 24.46 hy 4.77 ab 25.15 mt 1.39 an 23.91 il 1.98	Pomeroy Creek, Monarch District, Colorado.	R. M. Butters.	R. D. Crawford, Colo. G. S. B. 4, p. 137, 1913.	Quartz monzonite.	
16	I(II).4.(2)3.3(4).	Q 19.38 hy 6.71 or 20.57 mt 2.78 ab 30.39 il 0.76 an 16.08 ap 0.67	Frisco District, Utah.	R. C. Wells.	B. S. Butler, U. S. G. S. rec. lab.	Quartz monzonite.	
17	I(II).4.3.3.	Q 16.86 hy 2.80 or 23.91 mt 4.18 ab 18.86 hm 3.04 an 28.36 ap 0.67 C 0.51	Stoddard Mountain, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 348, p. 58, 1908.	Andesite.	

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
18	62.33	16.92	3.95	1.24	1.97	4.48	3.62	3.36	0.89	0.46	0.63	0.17	0.07	CO ₂ 0.04 ZrO ₂ 0.02 S 0.03 NiO none BaO 0.10 SrO 0.10 Li ₂ O trace Cu trace	100.38	
A1. I	1.039	.166	.025	.017	.049	.080	.058	.036			.008	.001				
19	67.45	15.51	1.76	2.21	1.10	3.60	3.47	3.66	0.63	0.14	0.58	0.12			100.25	
A2. II	1.124	.152	.011	.031	.028	.064	.056	.039			.007	.001				
20	66.68	15.12	1.66	2.49	1.38	4.09	2.23	4.97	0.51	0.31	0.64	0.21	0.01	CO ₂ none S trace SrO trace	100.30	2.715
A2. II	1.111	.148	.010	.035	.035	.073	.035	.053			.008	.001	—			
21	67.60	15.89	1.77	1.82	0.96	3.38	3.39	3.39	0.87	0.23	0.60	0.19	trace	CO ₂ none SrO trace	100.09	
A2. II	1.127	.156	.011	.025	.019	.061	.055	.036			.003	.001				
22	65.68	15.87	1.78	1.25	1.79	3.50	3.20	3.37	3.10		0.98	0.23			100.75	
A2. II	1.095	.155	.011	.018	.045	.062	.051	.036			.012	.002				
23	65.13	15.73	2.24	1.86	1.49	3.62	2.93	3.96	1.91	0.52	0.58	0.23	trace	NiO 0.07	100.27	
A2. II	1.086	.154	.014	.026	.037	.064	.047	.042			.007	.002	—			
24	63.16	16.74	3.94	0.47	1.12	4.07	3.88	3.71	0.77	1.12	0.61	0.30	0.04	CO ₂ none	99.93	
A2. II	1.053	.164	.024	.007	.028	.073	.063	.039			.008	.002	—			
25	59.99	16.14	4.42	0.13	1.51	4.17	3.04	2.82	4.06	3.35	0.64	0.24	0.05	CO ₂ none	100.56	
A2. II	1.000	.158	.028	.002	.038	.075	.049	.030			.008	.002	—			
26	63.08	15.74	4.94	0.42	1.38	4.10	3.16	3.39	0.98	1.70	0.71	0.17	0.07	CO ₂ trace ZrO ₂ 0.02 S trace BaO 0.10 SrO 0.04 Li ₂ O trace	100.00	
A1. I	1.051	.154	.031	.006	.035	.073	.051	.036			.009	.001	.001			
27	61.69	17.26	3.53	1.91	1.45	5.49	3.05	3.88	0.73			0.34	0.09	Cl 0.03 BaO 0.10	99.55	
A2. II	1.028	.169	.022	.026	.036	.098	.049	.041				.002	.001			
28	68.20	15.83	2.86	0.51	2.14	3.49	3.07	2.88	0.50		0.46	0.01	0.08	CO ₂ 0.06 FeS ₂ 0.01	100.10	
A2. II	1.137	.155	.018	.007	.054	.063	.050	.031			.006	—	.001			
29	68.24	16.08	0.81	2.20	0.40	3.42	3.34	3.99	0.83	0.08	0.01	0.03	0.05	CO ₂ 0.59 ZrO ₂ 0.12 BaO 0.15	100.34	2.668
A1. I	1.137	.158	.005	.030	.010	.061	.053	.042			—	—	—			
30	72.30	12.91	0.59	2.04	0.82	1.95	3.68	4.63	0.55	0.03	0.37	0.10	0.10	S none NiO none BaO 0.03 Li ₂ O none	100.10	
A1. I	1.205	.126	.004	.028	.021	.035	.060	.049			.005	.001	.001			
31	70.77	15.30	0.82	2.02	0.94	2.94	2.98	3.22	1.06						100.05	
A3. III	1.180	.150	.005	.028	.024	.053	.048	.034								
32	68.99	15.44	1.11	2.53	1.03	3.19	2.73	3.77	0.97						99.76	
A3. III	1.150	.151	.007	.035	.026	.057	.044	.040								

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. AMIATOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
18	I''4.3.3(4).	Q 16.02 di 1.08 or 20.02 hy 4.40 ab 80.39 mt 2.32 an 20.02 il 1.22 hm 2.40 ap 0.34	Tombstone, Arizona.	R. C. Wells.	F. L. Ransome, U. S. G. S. rec. lab.	Quartz monzonite.	
19	I''4.()3.3''.	Q 23.70 di 0.89 or 21.68 hy 4.08 ab 29.34 mt 2.55 an 15.85 il 1.06	Pyramid Peak, Eldorado County, California.	G. Steiger.	W. Lindgren, A. J. S., III, p. 306, 1897.	Granodiorite.	In W. T., p. 185.
20	I(II).4.''3.(2)3.	Q 24.06 di 2.20 or 29.47 hy 4.65 ab 18.34 mt 2.32 an 16.68 il 1.22 ap 0.34	Diamond Mesa, Mount Whitney quadrangle, California.	R. C. Wells.	U. S. G. S. rec. lab.	Quartz monzonite.	
21	I''4.(2)3.3(4).	Q 26.40 hy 2.69 or 20.02 mt 2.55 ab 28.82 il 1.22 an 16.12 ap 0.34 C 0.71	Cherry Creek, Egan Range, Nevada.	H. N. Stokes.	J. E. Spurr, U. S. G. S. B. 228, p. 206, 1904.	Quartz monzonite.	
22	I''4.(2)3.3''.	Q 25.08 hy 4.50 or 20.02 mt 1.89 ab 26.72 il 1.82 an 15.29 hm 0.80 C 1.33 ap 0.67	Waller Defeat Shaft, Washoe, Nevada.	G. E. Moore.	G. F. Becker, U. S. G. S. Mon. 3, p. 282, 1882.	Andesite.	Also in Hague and Iddings, U. S. G. S. B. 17, p. 33, 1885. In W. T., p. 183.
23	I''4.''3.3.	Q 23.76 hy 4.36 or 23.35 mt 3.25 ab 24.63 il 1.06 an 15.85 ap 0.67 C 0.82	South of Carbon Ridge, Eureka District, Nevada.	W. H. Melville.	Hague and Iddings, U. S. G. S. Mon. 20, p. 264, 1892.	Andesite.	In W. T., p. 183.
24	I''4.(2)3.3(4).	Q 17.10 di 0.86 or 21.68 hy 2.40 ab 33.01 il 1.08 an 17.24 hm 3.94 ap 0.67	Black Butte, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 52, 1909.	Andesite.	
25	I(II).4.3.3(4).	Q 21.12 hy 3.80 or 15.68 il 0.30 ab 25.68 hm 4.42 an 18.90 ru 0.48 C 1.12 ap 0.67	Black Cap Mountain, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 61, 1909.	Dacite vitrophyre.	
26	I(II).4.''3.3''.	Q 21.36 di 0.65 or 20.02 hy 3.30 ab 26.72 il 0.91 an 18.63 hm 4.94 ru 0.24 ap 0.34	Bullionville, n. Pioche, Nevada.	W. F. Hille- brand.	J. E. Spurr, U. S. G. S. B. 228, p. 208, 1904.	Quartz latite.	
27	I(II).4.3.3.	Q 16.68 di 2.62 or 22.80 hy 2.90 ab 25.68 mt 5.10 an 21.96 il 0.69	Weary Flat, Eau Range, Nevada.	H. Ross.	A. C. Lawson, Un. Cal., Dep. G., B. IV, p. 307, 1906.	Monzonite.	
28	I(II).''4.3.3(4).	Q 28.36 hy 5.40 or 17.24 mt 0.46 ab 26.20 il 0.91 an 17.51 hm 2.56 C 1.12	Essequibo, etc., rivers, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Br. Gui., p. 76, 1908.	Granitite.	Average sample. In W. T., p. 191.
29	I.4.(2)3.3.	Q 24.60 hy 4.30 or 23.35 mt 1.16 ab 27.77 an 16.96 C 0.20	Olavarria, Buenos Aires, Argentina.	M. Dittrich.	H. Backlund, Min. Agric. Arg. B. 2 B, p. 28, 1913.	Granodiorite.	
30	I''4.3(4)3.	Q 27.66 di 3.46 or 27.24 hy 3.02 ab 31.44 mt 0.93 an 4.73 il 0.76 ap 0.34	Huntley, Aberdeenshire, Scotland.	E. G. Radley.	J. J. H. Teall, pers. com., 1913.	Granite.	
31	I''(3)4.(2)3.3''.	Q 32.10 hy 5.44 or 18.90 mt 1.16 ab 25.15 an 14.72 C 1.53	Near Söderwiken, Ornö, Sweden.	O. Bäckström.	A. G. Högbom, B. G. Inst. Ups., X, p. 166, 1911.	Granite gneiss.	
32	I''.''4.(2)3.3.	Q 28.68 hy 6.30 or 22.24 mt 1.62 ab 22.53 an 15.85 C 1.02	Near Söderwiken, Ornö, Sweden.	O. Bäckström.	A. G. Högbom, B. G. Inst. Ups., X, p. 166, 1911.	Granite gneiss.	

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
33	68.26	14.35	1.30	2.34	1.13	2.85	2.45	3.64	3.17				0.70		100.19	
A3. III	1.138	.141	.008	.032	.018	.051	.040	.038					.010			
34	66.43	15.03	4.55	0.75	1.65	4.61	2.94	2.76	0.80		0.33		0.29		100.14	
A2. II	1.107	.147	.029	.011	.041	.082	.047	.030			.004		.004			
35	64.21	17.39	3.04	2.27	1.21	3.16	2.70	3.82	1.48						99.28	2.68
B3. IV	1.070	.170	.019	.032	.030	.056	.044	.040								
36	70.6	15.1	1.9	1.1	1.4	3.7	2.7	2.9	0.7					CO ₂ trace	100.1	
B3. IV	1.177	.148	.012	.015	.035	.066	.044	.031								
37	70.4	13.7	1.8	1.3	1.2	4.5	2.3	4.4	0.7						100.3	
B3. IV	1.173	.134	.011	.018	.020	.080	.037	.046								
38	67.04	16.07	4.72	1.20	3.09	2.04	4.61	0.95							100.92	
B3. IV	1.119	.158	.029	.030	.055	.033	.049									
39	64.45	15.80	1.97	2.89	1.72	4.15	2.89	4.34	1.75	0.12	0.58				100.66	
A3. III	1.074	.155	.012	.040	.043	.074	.047	.046			.007					
40	65.69	16.41	0.73	2.74	1.42	3.36	2.39	5.24	1.20		0.44	trace	trace	Cl 0.03 X 0.77 SO ₃ 0.17 Li ₂ O 0.24	100.83	2.581
A2. II	1.095	.161	.005	.038	.036	.060	.039	.056			.006	—	—			15°
41	65.53	16.89	1.00	2.38	1.17	3.24	2.71	4.59	1.98		0.46	trace	trace	SO ₂ 0.20 Cl 0.09 X 0.61 Li ₂ O trace	100.85	2.540
A2. II	1.092	.166	.006	.033	.029	.058	.044	.049			.006	—	—			15°
42	62.85	17.97	3.80	2.15	1.24	3.79	3.00	4.69	0.10			0.18			99.77	
A3. III	1.048	.177	.024	.030	.031	.068	.048	.050				.001				
43	62.15	18.07	3.31	2.75	1.54	4.36	2.51	5.00	0.23			0.25			100.15	
A3. III	1.036	.177	.021	.039	.039	.078	.040	.053				.002				
44	69.94	15.97	0.47	1.93	1.15	3.43	2.82	3.88			0.35				100.31	
A3. III	1.166	.157	.003	.026	.029	.061	.045	.041			.004					
45	66.05	15.86	1.75	1.67	1.85	4.10	2.24	4.36	1.78		0.96	0.18	0.03		99.93	2.594
A2. II	1.101	.155	.011	.023	.046	.073	.036	.047			.012	.001	—			
46	63.71	17.28	2.41	1.16	2.93	5.16	2.60	4.22	0.96			trace			100.43	2.707
A3. III	1.062	.169	.015	.016	.073	.092	.042	.045				—				15°
47	63.17	17.15	2.84	1.31	2.17	4.17	3.08	4.19	2.51						100.59	2.525
A3. III	1.053	.168	.018	.018	.054	.074	.050	.045								17°
48	61.93	18.47	1.93	2.23	2.66	4.31	2.92	3.92	2.28						100.65	2.601
A3. III	1.031	.181	.012	.031	.067	.077	.047	.042								18°

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOTASSIC. AMIATOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
33	I''.(3)4.(2)3.3.	Q 30.96 hy 6.29 or 21.13 mt 1.86 ab 20.96 an 14.18 C 1.22	Skrutten, Helsingland, Sweden.	H. Santesson.	F. Svenonius, G. F. F., X, p. 273, 1888.	Andesite breccia.	In W. T., p. 185.
34	I(II).4.3.3(4).	Q 27.12 di 2.59 or 16.68 hy 2.90 ab 24.63 mt 2.55 an 19.46 il 0.61 hm 2.88	Flakulla, Karlskrona, Blekinge, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 268, 1906.	Granite.	
35	I''.(4)(2)3.3.	Q 24.66 hy 4.72 or 22.24 mt 4.41 ab 23.06 C 3.06	Innozenzidorf, Lausitz, Saxony.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 26, 1902.	Granite.	
36	I''.(3)4.3.3''.	Q 33.42 hy 3.90 or 17.24 mt 2.78 ab 23.06 an 18.35 C 0.71	Near Erdmannsdorf, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J., 1905, II, p. 22.	Quartz porphyry.	Center of dike. Cf. No. 164, II.4.3.4.
37	I(II).''4.(2)3.3.	Q 30.42 di 6.42 or 25.58 hy 0.86 ab 19.39 mt 2.55 an 14.18	Schmiedeberg, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XV, p. 111, 1902.	Basic granite.	
38	I''.''4.(2)3.(2)3.	Q 29.22 hy 3.00 or 27.24 mt 3.94 ab 17.29 hm 1.92 an 15.29 C 2.14	Wilden Loch, Schladminger Tauern, Styria.	J. P. Ippen.	J. A. Ippen, Mt. Nw. Ver. Steierm., 1901, p. 131.	Granite.	
39	I(II).4.(2)3.3.	Q 18.96 di 2.72 or 25.58 hy 5.74 ab 24.63 mt 2.78 an 17.24 il 1.06	S. of Pontresina, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, pers. com., 1913.	Banatite.	
40	I''.(4)(2)3.''3.	Q 20.52 hy 7.16 or 31.14 mt 1.16 ab 20.44 il 0.91 an 16.68 C 0.61	Nocchetto, Monte Amiata, Tuscany.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 408, 1887.	Trachyte.	In W. T., p. 185.
41	I''.(4)(2)3.3.	Q 22.02 hy 5.80 or 27.24 mt 1.39 ab 23.06 il 0.91 an 16.12 C 1.53	Casa la Fornacina, Monte Amiata, Tuscany.	J. F. Williams.	J. F. Williams, N. J. B. B., V, p. 410, 1887.	Trachyte.	In W. T., p. 185
42	I(II).4.(2)3.3.	Q 17.58 hy 3.89 or 27.80 mt 5.57 ab 25.15 ap 0.34 an 18.07 C 1.43	Montalto, Monti Cimini, n. Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 507, 1912.	"Peperino" (biotite latite).	
43	I(II).4.''3.''3.	Q 16.74 hy 6.28 or 29.47 mt 4.87 ab 20.96 ap 0.67 an 19.74 C 1.33	Bagnaia, Monti Cimini, n. Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 507, 1912.	"Peperino" (biotite latite).	
44	I''.''4.''3.3.	Q 28.80 hy 5.41 or 22.50 mt 0.70 ab 23.58 il 0.61 an 16.96 C 1.02	Arbatax, Capo Bella Vista, Sardinia.	C. Riva.	C. Riva, Atti. Ac. Sc. Nap., (2), XII, No. 9, p. 27, 1905.	Granite.	
45	I(II).4.3.3.	Q 25.02 hy 4.60 or 26.13 mt 2.55 ab 18.86 il 1.82 an 19.46 ap 0.34 C 0.20	Ajuta, Belka Kamennaja Taganrog, Russia.	J. Morozewicz.	J. Morozewicz, Mem. Com. G. Russ., No. 8, p. 53, 1903.	Andesite.	
46	I(II).4.3.3.	Q 17.64 di 2.59 or 25.02 hy 6.23 ab 22.01 mt 3.48 an 22.24	Adami Mine, Laurion, Attica, Greece.	R. Lepsius.	R. Lepsius, Geol. Attika, p. 90, 1893.	Granite.	In W. T., p. 185.
47	I(II).4.''3.3.	Q 16.98 hy 5.40 or 25.02 mt 4.15 ab 26.20 an 20.29	Acropolis, Pergamon, Asia Minor.	H. S. Washing- ton.	H. S. Washington, A. J. S., III, p. 49, 1897.	Dacite.	In W. T., p. 185.
48	I(II).4''3.3.	Q 15.42 hy 9.21 or 23.35 mt 2.78 ab 24.63 an 21.41 C 1.53	Kara Tash, Smyrna, Asia Minor.	H. S. Washing- ton.	H. S. Washington, A. J. S., III, p. 45, 1897.	Andesite.	In W. T., p. 185.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
49	67.85	18.39	1.27	n. d.	0.60	4.82	2.38	3.42	2.23						100.96	
A4. IV	1.131	.180	.008	(.016)	.015	.086	.039	.036								
50	66.27	18.66	1.99	n. d.	0.66	4.89	3.65	3.39	0.70						100.21	
A4. IV	1.105	.183	.013	(.026)	.017	.087	.059	.036								
51	65.10	17.21	1.84	2.08	2.91	3.21	2.05	4.08	1.75		0.46				100.69	
A3. III	1.085	.169	.011	.029	.073	.057	.033	.044			.006					
52	68.92	15.26	0.80	3.30	1.64	3.04	2.71	2.93	1.04	0.22	0.70	0.19	trace	CO ₂ none SO ₂ none Cl none Li ₂ O trace	100.75	2.688
A2. II	1.149	.150	.005	.046	.041	.054	.044	.031			.009	.001	—			
53	67.75	16.11	0.50	4.00	0.79	2.68	2.60	3.42	0.96	0.20	0.85	0.09	trace	CO ₂ none	99.95	2.68
A2. II	1.129	.158	.003	.056	.020	.048	.042	.036		—	.011	—	—			
54	65.36	16.37	1.80	2.68	1.81	3.82	3.40	3.75	0.33	0.09	0.36	0.16	0.16	CO ₂ none ZrO ₂ trace SO ₂ none Cl 0.05 F 0.14 S none V ₂ O ₅ trace Cr ₂ O ₃ trace NiO none BaO 0.14 SrO trace Li ₂ O trace	100.42	2.71
A1. I	1.089	.160	.011	.038	.045	.068	.055	.040			.005	.001	.002			

RANG 3. ALKALICALCIC. COLORADASE.

1	67.74	16.13	1.50	1.96	1.36	4.41	4.92	1.30	0.86	0.10			trace		100.28	
A3. III	1.129	.158	.009	.027	.034	.079	.079	.014					—			
2	68.62	15.70	1.66	1.77	1.28	3.56	5.08	1.31	0.56	0.10	0.26	0.10	0.07	Cl none S 0.03 Cr ₂ O ₃ trace BaO 0.02	100.12	
A1. I	1.144	.154	.010	.025	.032	.064	.082	.014			.003	.001	.001			
3	66.74	16.67	0.67	2.99	1.14	3.55	4.46	2.16	0.78	0.29	0.31	0.10	0.01	CO ₂ 0.11	99.98	
A2. II	1.112	.163	.004	.042	.029	.064	.072	.023			.004	.001	—			
4	68.94	14.11	1.68	2.88	0.80	4.62	3.53	2.41	1.13	0.22	0.50	0.08	0.05	BaO 0.04	100.99	2.723
B2. III	1.149	.138	.011	.040	.020	.082	.056	.026			.006	—	—			
5	69.48	16.42	0.56	2.60	1.15	3.45	4.59	1.18	0.34		0.40	0.11	0.02	ZrO ₂ 0.02 SO ₂ 0.07 NiO none BaO 0.05 SrO none Cu ₂ Zn none	100.45	
A1. I	1.158	.161	.004	.036	.029	.062	.074	.013			.005	.001	—			
6	62.91	19.13	0.98	3.20	1.69	4.28	3.94	3.38	0.63					Li ₂ O trace	100.14	
A3. III	1.049	.187	.006	.044	.042	.077	.063	.035								
7	63.55	16.57	2.36	1.98	1.53	4.69	3.78	2.78	1.11	0.31	0.42	0.21	0.13	CO ₂ 0.69 SO ₂ 0.06 BaO 0.15 SrO 0.04	100.36	
A1. I	1.059	.163	.015	.028	.038	.084	.061	.030			.005	.002	.002			
8	65.23	16.94	1.60	1.91	1.31	3.85	3.57	3.02	0.88	0.18	0.66	0.19	trace	CO ₂ 0.25 SO ₂ none S none BaO 0.19	99.78	
A1. I	1.087	.166	.010	.027	.033	.069	.058	.032			.008	.001	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 3. SODIPOPASSIC. AMIATOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
49	I.4.3.3.⊙	Q 28.68 hy 3.61 or 20.02 ab 20.44 an 23.91 C 1.94	Cap Blanc, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, p. 59, 1900.	Dacite.	In W. T., p. 185.
50	I.4.3.3(4).	Q 19.08 hy 5.13 or 20.02 ab 30.92 an 24.19	Cap Blanc, n. Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Phys. Gen., XXXIII, p. 59, 1900.	Dacite.	In W. T., p. 185.
51	I(II).4.''3.''3.	Q 25.44 hy 8.88 or 24.46 mt 2.55 ab 17.23 il 0.91 an 15.85 C 3.57	Koudiat es-Sakra, Beni Toufont, Algeria.	P. Termier.	P. Termier, C. R., CXXXVI, p. 329, 1903.	Microgranite.	
52	I''.(3).4.(2)3.3.	Q 31.44 hy 8.32 or 17.24 mt 1.16 ab 23.06 il 1.37 an 14.18 ap 0.34 C 2.45	Hesket, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict., B. 24, p. 20, 1912.	Granodiorite.	
53	I(II).(3)4.(2)3.3.	Q 30.18 hy 7.24 or 20.02 mt 0.70 ab 22.01 il 1.67 an 13.34 C 3.26	Gellibrand, Broadmeadow, Victoria.	A. S. Richards.	F. L. Stillwell, Fr. R. Soc. Vict., XXIV, (1), p. 177, 1911.	Granite.	
54	I(II).4.(2)3.3''.	Q 19.20 hy 7.67 or 22.24 mt 2.55 ab 28.82 il 0.76 an 18.07 ap 0.34	Tenterfield, New England, New South Wales.	J. C. H. Min- gaye.	E. C. Andrews, Rec. G. S. N. S. W., VIII, (3), p. 203, 1907.	Granite.	

SUBRANG 4. DOSODIC. YELLOWSTONOSE. (C. I. P. W., 1902.)

1	I''.4.''3.4(5).	Q 22.62 di 3.18 or 7.75 hy 3.98 ab 41.39 mt 2.09 an 18.07	Opimika Narrows, Lake Temiskam- ing, Quebec.	F. G. Wait.	G. C. Hoffmann, Can. G. S. A. R., IX, p. 19R (1896), 1898.	Granitite gneiss.	In W. T., p. 185.
2	I''.4.''3.4(5).	Q 24.18 di 0.68 or 7.78 hy 4.72 ab 42.97 mt 2.32 an 16.12 il 0.46 ap 0.34	Hopkins Bay, Rainy Lake, Ontario.	M. F. Connor.	A. W. Lawson, Can. G. S., Mem. 40, p. 93, 1913.	Granite gneiss.	
3	I(II).4.(2)3.4.	Q 21.42 hy 7.39 or 12.79 mt 0.93 ab 37.73 il 0.61 an 16.96 ap 0.34 C 0.71	Stave Island, n. Portland, Maine.	W. C. Wheeler.	U. S. G. S. rec. lab.	Granite porphyry.	
4	I(II).''4.''3.''4.	Q 28.56 di 6.07 or 14.46 hy 1.99 ab 29.34 mt 2.55 an 15.57 il 0.91	Saugus Essex County, Massachusetts.	M. F. Connor.	C. H. Clapp, pers. com.	Granodiorite.	
5	I''.4.(2)3.4(5).	Q 27.72 hy 6.46 or 7.23 mt 0.93 ab 38.77 il 0.76 an 16.40 ap 0.34 C 1.53	Morris Plains, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1908), p. 70, 1909.	Granite.	
6	I(II).4''.3.(3)4.	Q 13.62 hy 9.22 or 19.46 mt 1.39 ab 33.01 an 21.41 C 1.22	Dorseys Run, Howard County, Maryland.	W. F. Hille- brand.	C. R. Keyes, U. S. G. S. A. R. 15, p. 722, 1895.	Granite.	In W. T., p. 185.
7	I(II).4.3.''4.	Q 18.96 di 1.11 or 16.68 hy 4.59 ab 31.96 mt 3.48 an 20.02 il 0.76 ap 0.67	Woodchopper Gulch, Marys- ville District, Montana.	G. Steiger.	J. S. Burrell, U. S. G. S. P. P. 57, p. 55, 1907.	Quartz diorite.	
8	I''.4.''3.(3)4.	Q 22.38 hy 4.49 or 17.79 mt 2.32 ab 30.39 il 1.22 an 18.35 ap 0.34 C 1.02	Willow Creek District, Boise County, Idaho.	G. Steiger.	W. Lindgren, U. S. G. S. A. R. 18, III, p. 640, 1898.	Granite.	In W. T., p. 187.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9	67.54	17.02	2.97	0.34	0.13	3.36	4.62	2.28	0.55		0.80	trace	trace	SO ₃ 0.26 Cl 0.15 Li ₂ O 0.03	100.05	
A2. II	1.126	.167	.019	.005	.003	.060	.074	.024			.010	—	—			
10	66.05	16.96	2.59	1.38	2.08	3.37	4.20	2.53	0.69		0.34	trace	none	SO ₃ 0.03 Cl trace Li ₂ O none	100.22	
A2. II	1.101	.166	.016	.019	.052	0.60	.068	.027			.004	—	—			
11	65.97	16.53	2.59	1.72	2.11	3.37	3.41	2.67	1.23		0.42	trace	none	SO ₃ 0.13 Cl 0.09 Li ₂ O 0.09	100.33	
A2. II	1.100	.162	.016	.024	.053	.060	.055	.028			.005	—	—			
12	65.60	17.61	0.95	2.76	1.49	3.72	4.36	2.36	0.59		0.75	0.16	none	SO ₃ trace Cl none Li ₂ O 0.03	100.38	
A2. II	1.093	.173	.006	.038	.038	.066	.070	.025			.009	.001	—			
13	64.85	16.57	2.10	2.15	2.14	4.01	3.71	3.10	0.35		0.91	0.14	none	SO ₃ trace Cl none Li ₂ O none	100.03	
A2. II	1.081	.162	.013	.030	.054	.072	.060	.033			.011	.001	—			
14	65.66	15.61	2.10	2.07	2.46	3.64	3.65	2.03	1.07		1.37	trace	none	SO ₃ 0.13 Cl 0.12 Li ₂ O 0.36	100.27	
A2. II	1.094	.153	.013	.029	.062	.065	.059	.021			.017	—	—			
15	64.27	17.84	3.36	1.29	2.00	3.42	3.84	2.48	1.32		0.32	0.16	none	SO ₃ trace Cl none Li ₂ O 0.03	100.33	
A2. II	1.071	.175	.021	.018	.050	.061	.062	.026			.004	.001	—			
16	65.63	17.00	2.55	1.19	2.03	3.48	4.42	1.64	2.00		trace	0.07	none	CO ₂ 0.27 SO ₃ trace Cl trace Li ₂ O 0.04	100.32	
A2. II	1.094	.167	.016	.017	.051	.062	.071	.018			—	—	—			
17	64.61	18.62	2.78	0.95	0.85	4.20	4.37	2.36	0.93		none	0.30	trace	CO ₂ 0.25 SO ₃ trace Cl trace Li ₂ O 0.01	100.23	
A2. II	1.077	.182	.017	.014	.021	.075	.071	.025			—	.002	—			
18	64.23	16.34	1.07	1.58	2.47	3.07	3.49	2.59	1.76	0.47	0.50	0.18	trace	CO ₂ 0.30 FeS ₂ 1.61 NiO none BaO 0.19 SrO 0.06 Li ₂ O trace	99.91	
A1. I	1.071	.160	.007	.022	.062	.055	.056	.027			.006	.001	—			
19	63.42	17.16	3.09	1.50	1.64	4.65	4.51	3.04	0.28	0.16	0.35	0.26	0.04	NiO 0.19	100.29	
A2. II	1.057	.168	.019	.021	.041	.083	.073	.032			.004	.002	—			
20	61.50	17.42	4.66	1.09	1.26	5.33	3.99	1.29	2.44		none	0.60	trace	SO ₃ 0.35 Li ₂ O 0.03	99.96	
A2. II	1.025	.171	.029	.015	.032	.094	.064	.014			—	.004	—			
21	67.01	18.03	0.66	0.72	0.84	3.99	4.42	3.53	0.91			0.10	0.09	BaO 0.10	100.40	
A2. II	1.117	.177	.004	.010	.021	.071	.071	.037				.001	.001			
22	63.66	17.05	1.97	2.62	1.99	3.89	4.13	3.09	1.19			0.27	0.14	SrO 0.06	100.08	
A2. II	1.061	.167	.013	.036	.050	.070	.066	.033				.002	.002			
23	62.85	16.21	3.08	1.46	1.47	4.72	3.49	3.10	2.03	0.29	0.41	0.48	0.15	BaO 0.11	99.85	
A2. II	1.048	.159	.019	.020	.037	.084	.056	.033			.005	.003	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	I.4.(2)3.4.	Q 24.90 hy 0.30 or 13.34 il 0.76 ab 38.77 hm 2.97 an 16.68 ru 0.40 C 0.92	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 116, 1899.	Quartz diorite.	Also in U.S.G.S. A.R.12, p.627, 1891. In W. T., p. 187.
10	I(II).4.(2)3.4.	Q 21.54 hy 5.20 or 15.01 mt 3.45 ab 35.63 il 0.61 an 16.68 hm 0.16 C 1.12	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 116, 1899.	Quartz diorite.	Also in U.S.G.S. A.R.12, p.627, 1891. In W. T., p. 187.
11	I(II).4.''3.''4.	Q 25.56 hy 5.70 or 15.58 mt 3.71 ab 28.82 il 0.76 an 16.68 C 1.94	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 116, 1899.	Quartz diorite porphyrite.	Also in U.S.G.S. A.R.12, p.627, 1891. In W. T., p. 187.
12	I(II).4.(2)3.4.	Q 20.16 hy 6.84 or 13.35 mt 3.02 ab 36.68 il 1.37 an 17.51 ap 0.34 C 1.53	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 116, 1899.	Quartz diorite.	Also in U.S.G.S. A.R.12, p.627, 1891. In W. T., p. 187.
13	I(II).4.''3.(3)4	Q 19.50 hy 16.19 or 13.35 mt 3.02 ab 31.44 il 1.67 an 19.18 ap 0.34	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 116, 1899.	Quartz diorite.	Also in U.S.G.S. A.R.12, p.627, 1891. In W. T., p. 187.
14	I(II).4.''3.4.	Q 25.32 hy 6.20 or 11.68 mt 3.02 ab 30.92 il 2.58 an 18.07 C 0.82	Sepulchre Mountain, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 135, 1899.	Dacite.	Also in U.S.G.S. A.R.12, p.648, 1891. Li ₂ O high? In W. T., p. 187.
15	I(II).4.(2)3.4.	Q 22.62 hy 5.00 or 14.46 mt 3.25 ab 32.48 il 0.61 an 16.12 hm 1.12 C 2.96 ap 0.34	Sepulchre Mountain, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 135, 1899.	Andesite.	Also in U.S.G.S. A.R.12, p.648, 1891. In W. T., p. 187.
16	I''4.''3.4.	Q 23.10 hy 5.10 or 10.01 mt 3.71 ab 37.20 an 17.24 C 1.63	Fan Creek, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 81, 1899.	Andesite porphyry.	In W. T., p. 187.
17	I''4.''3.4.	Q 20.64 hy 2.10 or 13.90 mt 3.25 ab 37.20 hm 0.48 an 18.90 ap 0.67 C 1.84	Crescent Hill, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 272, 1899.	Andesite.	In W. T., p. 187.
18	I(II).4.(2)3.''4.	Q 23.88 hy 7.39 or 15.01 mt 1.62 ab 29.34 il 0.91 an 14.46 ap 0.34 C 2.55 pr 1.61	Crater Mountain, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggard, U. S. G. S. B. 168, p. 96, 1900.	Granite porphyry.	In W. T., p. 187
19	I(II).4''.(2)3.4.	Q 14.76 di 2.59 or 17.79 hy 2.90 ab 38.25 mt 3.94 an 17.79 il 0.61 hm 0.32 ap 0.67	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 261, 1899.	Quartz diorite porphyry.	In W. T., p. 187.
20	I(II).4.2.4''.	Q 21.78 hy 3.20 or 7.78 mt 3.48 ab 33.54 hm 2.13 an 22.52 ap 1.54 C 1.12	Indian Creek Laccolith, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 61, 1899.	Porphyrite.	In W. T., p. 187.
21	I.4.(2)3.(3)4.	Q 18.42 di 0.22 or 20.57 hy 2.79 ab 37.20 mt 0.93 an 18.63 ap 0.34	Copper Mountain, Leadville, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 148, p. 176, 1897.	Diorite porphyry.	In W. T., p. 187.
22	I(II).4''.(2)3.''4.	Q 15.96 hy 8.30 or 17.35 mt 3.02 ab 34.58 ap 0.67 an 17.51 C 0.51	Gold Hill, Ten Mile District, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 14, p. 227, 1894.	Quartz porphyrite.	In W. T., p. 187,
23	I(II).4.3.(3)4.	Q 19.98 di 0.88 or 18.35 hy 3.30 ab 29.34 mt 3.94 an 19.46 il 0.76 hm 0.32 ap 1.01	Mount Marcellina, West Elk Moun- tains, Colorado.	T. M. Chatard.	W. Cross, U. S. G. S. A. R. 14, p. 227, 1894.	Diorite porphyrite.	In W. T., p. 189.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
24	59.29	21.27	3.33	1.04	1.12	5.25	3.39	3.00	1.63			0.23	0.21		99.76	2.596
A2. II	.983	.208	.020	.014	.028	.094	.055	.032				.002	.003			14.5°
25	64.84	16.49	1.87	2.28	1.58	4.54	4.18	2.46	0.98	0.19	0.50	0.19	0.06	CO ₂ trace ZrO ₂ 0.01 BaO 0.02 SrO none Li ₂ O none	100.19	
A1. I	1.081	.162	.012	.032	.040	.081	.068	.027			.006	.001	—			
26	62.61	17.54	2.72	1.52	1.39	4.18	4.88	2.21	1.52	0.22	0.60	0.27	0.14	CO ₂ none ZrO ₂ none S 0.06 BaO 0.18	100.04	
A1. I	1.044	.172	.017	.021	.035	.075	.079	.023			.008	.002	.001			
27	62.48	18.07	2.61	1.97	1.34	4.67	4.69	2.16	0.52	0.12	0.60	0.28	0.17	CO ₂ none ZrO ₂ none S 0.03 BaO 0.09	99.79	
A1. I	1.041	.177	.016	.028	.034	.084	.076	.023			.008	.002	.001			
28	68.43	15.80	1.06	1.85	1.46	4.08	3.47	2.51	0.53	0.05	0.20	0.07	0.10	BaO 0.09 SrO 0.02	99.72	2.708
A2. II	1.141	.155	.007	.026	.037	.073	.056	.027			.003	—	.001			
29	63.30	17.64	1.58	3.08	1.23	5.03	4.56	1.16	0.51	0.14	0.50	0.27	0.47	BaO 0.05 SrO none	99.52	2.721
A2. II	1.055	.173	.010	.043	.031	.089	.074	.012			.006	.002	.007			
30	66.55	16.21	1.98	1.80	1.32	3.86	4.07	2.84	0.24	0.01	0.40	0.15	0.12	BaO 0.03 SrO 0.01	99.59	2.693
A2. II	1.109	.159	.013	.025	.033	.069	.066	.030			.005	.001	.002			
31	64.44	17.05	1.53	2.40	1.28	4.28	5.16	1.48	0.78	0.02	0.45	0.31	0.03		99.21	
B2. III	1.074	.167	.010	.033	.032	.077	.083	.016			.006	.002	—			
32	71.23	14.61	0.93	1.66	1.01	3.29	4.00	1.92	0.55	0.17	0.34	0.14	0.08	ZrO ₂ 0.02 S trace BaO 0.08 SrO 0.02 Li ₂ O trace	100.05	
A1. I	1.187	.143	.006	.023	.025	.059	.065	.020			.004	.001	.001			
33	70.33	15.74	1.43	0.83	0.53	3.38	4.33	1.87	1.16	0.20	0.27	0.06	trace	CO ₂ trace ZrO ₂ none S trace BaO 0.09 SrO trace	100.22	
A1. I	1.172	.154	.009	.011	.013	.061	.069	.020			.003	—	—			
34	60.88	17.71	2.92	2.17	2.21	4.32	4.17	2.68	1.47	0.54	0.41	0.16	trace	CO ₂ none S trace Cr ₂ O ₃ none BaO 0.06 SrO trace	99.70	
A1. I	1.015	.174	.018	.031	.055	.077	.068	.029			.005	.001	—			
35	68.12	16.24	1.26	2.08	1.35	3.80	3.89	2.54	0.40		0.25	0.14	0.10	Cr ₂ O ₃ none BaO 0.09 SrO 0.02 Li ₂ O trace	100.28	
A1. I	1.135	.159	.008	.030	.034	.068	.063	.027			.003	.001	.001			
36	68.10	15.18	1.34	1.70	2.06	4.66	3.71	1.48	0.55		0.35	0.18	0.20	BaO 0.06	99.57	
A2. II	1.135	.149	.008	.024	.052	.088	.059	.016			.004	.001	.003			
37	64.52	18.31	0.90	2.51	2.35	5.11	4.64	1.25	0.20						99.79	
A3. III	1.075	.179	.006	.035	.059	.091	.075	.014								
38	64.48	19.28	1.40	1.78	1.64	5.06	4.41	1.12	0.06						99.23	
B3. IV	1.075	.189	.009	.025	.041	.090	.071	.012								
39	64.24	18.67	1.40	1.96	1.48	4.11	4.14	1.71	1.18		0.76	0.08	trace	SO ₃ 0.22 Cl 0.25	100.20	
A2. II	1.071	.183	.009	.028	.037	.073	.067	.018			.009	—	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
24	I''4''3.(3)4.	Q 15.84 hy 2.80 or 17.79 mt 3.94 ab 28.82 hm 0.48 an 24.19 ap 0.67 C 3.47	Table Mountain, Denver, Colorado.	L. G. Eakins.	W. Cross, Proc. Colo. Sci. Soc., I, p. 72, 1886.	Andesite.	In W. T., p. 189.
25	I(II).4.(2)3.4.	Q 18.90 di 3.37 or 15.01 hy 4.35 ab 35.63 mt 2.78 an 17.51 il 0.91 ap 0.34	Near Troy, Ray District, Arizona.	R. C. Wells.	F. L. Ransome, U. S. G. S. rec. lab.	Granodiorite.	
26	I(II).4''.(2)3.4.	Q 15.54 hy 3.70 or 12.79 mt 3.02 ab 41.39 il 1.22 an 18.90 hm 0.64 C 0.20 ap 0.67	Ortiz Mountains, n. Albuquerque, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 232, 1908.	Dacite.	
27	I(II).4''3.4.	Q 15.06 hy 4.19 or 12.79 mt 3.71 ab 39.82 il 1.22 an 21.68 ap 0.67	Ortiz Mountains, n. Albuquerque, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 232, 1908.	Dacite.	
28	I''4.3.''4.	Q 26.70 hy 5.94 or 15.01 mt 1.62 ab 29.34 il 0.46 an 20.02	Osoyoos Batholith, Okanagan Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38, (1), p. 449, 1912.	Granite.	
29	I(II).4.3.4(5).	Q 18.60 hy 7.59 or 6.67 mt 2.32 ab 38.77 il 0.91 an 22.80 ap 0.67 C 0.51	Rommel Batholith, Okanagan Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38, (1), p. 444, 1912.	Diorite.	
30	I''4.(2)3.''4.	Q 21.72 di 0.68 or 16.68 hy 4.16 ab 34.58 mt 3.02 an 17.51 il 0.76 ap 0.34	Similkameen Batholith, Okanagan Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38, (1), p. 456, 1912.	Granodiorite.	
31	I(II).4.''3.4''.	Q 17.58 di 0.46 or 8.90 hy 5.21 ab 43.49 mt 2.32 an 18.93 il 0.91 ap 0.67	Siwash Creek, Tulameen District, British Columbia.	M. F. Connor.	C. Camsell, Can. G. S. Mem. 26, p. 77, 1913.	Granodiorite.	
32	I''.''4.(2)3.4.	Q 31.56 hy 4.46 or 11.12 mt 1.39 ab 24.06 il 0.61 an 15.57 ap 0.34 C 0.20	Bald Mountain, n. Sumpter, Oregon.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 22, II, p. 587, 1901.	Granodiorite.	
33	I.''4.''3.4.	Q 30.18 hy 1.30 or 11.12 mt 2.09 ab 36.15 il 0.46 an 16.96 C 0.41	Boulder Creek, Port Orford quadrangle, Oregon.	W. F. Hillebrand.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Dacite porphyry.	
34	I(II).4''.''3.4.	Q 13.32 hy 6.56 or 16.12 mt 4.18 ab 35.63 il 0.76 an 20.57 ap 0.34 C 0.31	Brush Creek, n. Bald Mountain Port Orford quadrangle, Oregon.	H. N. Stokes.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Gabbro.	
35	I''4.''3.4.	Q 25.74 hy 6.04 or 14.01 mt 1.86 ab 33.01 il 0.46 an 18.35 ap 0.34 C 0.31	Crater Peak, Shasta County, California.	W. F. Hillebrand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 731, 1896.	Andesite.	Also in J. G., III, p. 407, 1895. In W. T., p. 189.
36	I(II).''4.3.4.	Q 27.84 di 1.36 or 8.90 hy 6.52 ab 30.92 mt 1.86 an 20.57 il 0.61 ap 0.34	Ono, Shasta County, California.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 191, 1897.	Diorite.	In W. T., p. 189.
37	I(II).4.3.4''.	Q 16.26 hy 9.73 or 7.78 mt 1.39 ab 39.30 an 25.30	West base of Mount Shasta, California.	W. H. Melville.	J. S. Diller, U. S. G. S. B. 150, p. 228, 1898.	Hypersthene andesite.	In W. T., p. 189.
38	I''4.3.4(5).	Q 20.40 hy 6.21 or 6.67 mt 2.09 ab 37.20 an 25.03 C 1.63	Black Butte, Mount Shasta, California.	W. H. Melville.	J. S. Diller, U. S. G. S. B. 150, p. 223, 1898.	Hornblende andesite.	In W. T., p. 189.
39	I''4.3.4.	Q 22.08 hy 5.02 or 10.01 mt 2.09 ab 35.11 il 1.37 an 20.29 C 2.55	Clear Creek, Shasta County, California.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. B. 150, p. 236, 1898.	Dacite porphyry.	In W. T., p. 189.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
40	63.81	17.07	2.11	2.15	2.28	4.97	4.08	1.96	1.03		0.38	0.10	0.09	BaO 0.04 SrO 0.03 Li ₂ O trace	100.10	
A1. I	1.064	.167	.013	.030	.047	.089	.066	.021			.005	.001	.001			
41	67.33	15.93	1.90	1.59	1.63	4.09	3.76	2.46	0.66	0.19	0.36	0.11	0.09	BaO 0.08 SrO trace Li ₂ O trace	100.18	
A1. I	1.122	.156	.012	.022	.041	.073	.061	.027			.005	.001	.001			
42	66.94	16.49	1.41	1.87	1.98	4.77	3.88	1.65	0.22	0.35	0.30	0.12	0.13	BaO 0.07 SrO 0.05 Li ₂ O trace	100.23	
A1. I	1.116	.161	.009	.027	.050	.086	.063	.018			.004	.001	.002			
43	66.65	17.61	0.93	1.67	1.26	4.44	4.59	1.70	0.41	0.03	0.33	0.18	0.07	BaO 0.12 SrO trace Li ₂ O trace	99.99	
A1. I	1.111	.172	.006	.024	.032	.079	.074	.018			.004	.001	.001			
44	66.65	16.15	1.52	2.36	1.74	4.53	3.40	2.65	0.72	0.18	0.38	0.10	0.10	FeS ₂ 0.02 BaO 0.07 SrO trace Li ₂ O trace	100.57	
A1. I	1.111	.168	.009	.033	.044	.080	.055	.029			.005	.001	.001			
45	65.43	17.11	2.39	1.19	1.48	3.88	3.66	2.83	0.36	0.20	0.83	trace	0.70	NiO 0.20	100.26	
A2. II	1.091	.168	.015	.017	.037	.070	.059	.030			.010	—	.010			
46	63.86	16.07	1.56	2.31	2.11	4.94	3.59	1.91	0.81	1.47	0.45	0.12	0.05	ZrO ₂ 0.04 S 0.84 BaO 0.03 Li ₂ O trace	100.16	
A1. I	1.064	.157	.010	.032	.053	.088	.058	.020			.006	.001	—			
47	63.12	16.13	3.53	3.65	1.86	5.04	2.78	1.08	0.93	0.97	trace	0.39	0.38	SrO 0.03	99.89	
A2. II	1.052	.158	.022	.051	.047	.090	.045	.012			—	.003	.005			
48	63.30	17.81	3.42	0.83	2.07	5.12	4.27	2.26	0.88					Li ₂ O trace	99.96	
A3. III	1.055	.175	.021	.011	.052	.091	.069	.024								
49	66.02	17.06	2.14	3.01	1.97	4.64	3.98	1.44	0.36		0.05				100.67	2.544
A3. III	1.100	.167	.013	.042	.049	.083	.065	.015			—					
50	65.10	16.16	3.28	0.90	1.82	4.30	3.35	2.40	2.58			0.30			100.19	2.574
A3. III	1.085	.158	.020	.012	.046	.077	.054	.025				.002				
51	68.50	16.00	2.94	n. d.	1.54	3.84	3.68	1.76	1.40	0.28			trace		99.94	
A4. IV	1.142	.157	.018	(.036)	.036	.069	.060	.019					—			
52	59.38	19.86	3.84	2.17	1.18	5.80	4.92	1.15	0.73	0.36	0.49	0.18	trace	CO ₂ none SO ₂ 0.27 Cr ₂ O ₃ trace BaO trace	100.33	
A2. II	.990	.195	.024	.030	.030	.104	.079	.012			.006	.001	—			
53	65.17	15.22	2.08	3.98	1.19	3.79	3.71	1.52	2.57		0.96			CO ₂ 0.32 SO ₂ none	100.57	
A3. III	1.086	.149	.013	.056	.030	.068	.060	.016			.012					
54	69.90	14.16	2.98	1.08	1.38	4.30	3.20	1.95	1.08		0.83	trace			100.86	
A3. III	1.165	.139	.019	.015	.035	.077	.052	.021			.010	—				

ORDER 4. QUARDOFELIO. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
40	I(II).4.3.4.	Q 18.96 di 1.36 or 14.68 hy 5.75 ab 34.58 mt 3.02 an 22.24 il 0.76 ap 0.34	Mill Creek, Shasta County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 194, 1897.	Dacite.	In W. T., p. 189.
41	I''4.''3.4.	Q 24.54 di 0.43 or 15.01 hy 4.69 ab 31.96 mt 2.78 an 18.90 il 0.76 ap 0.34	Mount Ingalls, Plumas County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 724, 1896.	Granodiorite.	Also in J. G., III, p. 403, 1895. In W. T., p. 189.
42	I(II).4.3.4.	Q 23.46 di 0.65 or 10.01 hy 6.81 ab 33.01 mt 2.09 an 22.24 il 0.61 ap 0.34	Goodyears Bar, Sierra County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 731, 1896.	Hypersthene andesite.	Also in J. G., III, p. 407, 1895. In W. T., p. 189.
43	I''4.3.4.	Q 21.24 hy 5.18 or 10.01 mt 1.39 ab 38.78 il 0.61 an 21.13 ap 0.34 C 0.41	Indian Valley, Sierra County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 724, 1896.	Quartz diorite porphyry.	Also in J. G., III, p. 403, 1895. In W. T., p. 189.
44	I''4.3.(3)4.	Q 23.34 hy 7.04 or 18.12 mt 2.09 ab 28.82 il 0.76 an 21.41 ap 0.34 C 0.71	Nevada City, Nevada County, California.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 38, 1896.	Granodiorite.	In W. T., p. 189.
45	I''4.3.''4.	Q 22.68 hy 3.96 or 16.68 mt 3.48 ab 30.92 il 1.52 an 19.46 C 0.92	Clear Lake, California.	W. H. Melville.	G. F. Becker, U. S. G. S. Mon. 13, p. 154, 1888.	Andesite ("asperite").	In W. T., p. 189.
46	I(II).4.3.4.	Q 21.78 di 1.36 or 11.12 hy 6.75 ab 30.39 mt 2.32 an 21.96 il 0.91 ap 0.34	Sept. 14, 1914, Lassen Peak, California.	W. C. Wheeler.	J. S. Diller, U. S. G. S. rec. lab.	Ashes (andesite).	
47	I(II).(3)4.3''4.	Q 28.14 hy 9.19 or 6.67 mt 5.10 ab 23.58 ap 1.01 an 22.24 C 2.14	Bodega Peninsula, Marin County, California.	V. C. Osmont.	V. C. Osmont, Un. Cal., Dep. G., B. IV, p. 47, 1904.	Quartz- biotite diorite.	
48	I(II).4''3.4.	Q 16.38 di 2.16 or 13.34 hy 4.20 ab 36.16 mt 2.55 an 22.52 hm 1.60	Mount Rose, Washoe, Nevada.	R. W. Wood- ward.	G. F. Becker, U. S. G. S. Mon. 3, p. 152, 1882.	Andesite.	In W. T., p. 189.
49	I(II).4.3.4.	Q 22.56 hy 8.73 or 8.34 mt 3.02 ab 34.06 an 23.07	Cerro de Tlapa- coya, Lake Chalco, Mexico.	A. Röhrig.	H. Lenk, Btr. G. Mex., II, p. 233, 1899.	Andesite.	In W. T., p. 189.
50	I(II).4.3.''4.	Q 25.50 hy 4.60 or 13.90 mt 2.78 ab 28.30 hm 1.28 an 19.46 ap 0.67 C 0.92	Near Tlaxiaco, Oaxaca, Mexico.	A. Röhrig.	H. Lenk, Btr. G. Mex., II, p. 132, 1899.	Trachyte.	In W. T., p. 189.
51	I''4.3.4.	Q 27.48 hy 8.35 or 10.56 ab 31.44 an 19.18 C 0.92	Cerro Quemado Volcano, n. Quetzaltenango, Guatemala.	Börner.	A. Bergeat, N. J. Cb., 1903, p. 291.	Andesite pumice.	
52	I(II).4(5).3.4(5).	Q 12.72 hy 3.00 or 6.67 mt 5.57 ab 41.39 il 0.91 an 28.06 ap 0.34 C 0.51	Eruption of October, 1902, Santa Maria Volcano, Guatemala.	E. T. Allen.	U. S. G. S. B. 228, p. 273, 1904.	Volcanic dust (andesite).	
53	I(II).4.3.4.	Q 25.98 hy 7.09 or 8.90 mt 3.02 ab 31.44 il 1.82 an 18.90 C 0.51	Panama, Canal Zone.	R. C. Wells.	D. F. McDonald, U. S. G. S. rec. lab.	Andesite breccia.	
54	I(II).(3)4.3.4.	Q 32.94 di 2.38 or 11.68 hy 2.40 ab 27.25 mt 1.16 an 18.35 il 1.52 Lm 2.24	Serro Colorado, Aruba Island, West Indies.	Perlstein.	J. H. Kloos, Samml. G. R. Mus. Leiden, I, p. 19, 1887.	Quartz diorite.	In W. T., p. 191.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
55	66.28	16.23	2.71	1.62	1.03	4.03	3.36	1.60	2.65						99.51	2.61
A3. III	1.105	.159	.017	.022	.026	.071	.054	.017								
56	66.20	17.58	1.56	2.47	1.80	5.80	3.48	1.40	0.37		0.38				101.04	
B3. IV	1.103	.172	.010	.035	.045	.104	.056	.015			.005					
57	63.70	18.18	2.56	2.33	2.28	5.11	3.47	1.11	0.31		0.31	0.13			99.49	
A2. II	1.062	.178	.016	.032	.057	.091	.056	.012			.004	.001				
58	61.25	19.50	2.40	2.05	0.93	5.82	3.72	1.75	1.82		0.33	0.19			99.76	
A2. II	1.021	.191	.015	.029	.023	.104	.060	.019			.004	.001				
59	67.40	19.06	0.71	1.31	1.90	4.30	3.16	1.52	0.30		0.34	0.02	0.06	CO ₂ FeS ₂ CuS	0.32 trace trace	100.40
A2. II	1.123	.187	.004	.018	.048	.077	.051	.016			.004	—	—			
60	65.88	15.61	2.42	2.71	1.76	3.70	3.92	2.29	1.05		0.43	0.13	0.08	CO ₂ ZrO ₂ Cl FeS ₂ CoO BaO CuO Pb	trace trace 0.02 trace none none trace none	100.00
A1. I	1.098	.153	.015	.038	.044	.066	.063	.024			.005	.001	.001			
61	62.95	20.81	1.73	0.39	2.66	3.75	4.15	3.46	0.20		trace	0.09	none	CO ₂ S	0.02 trace	100.22
A3. III	1.049	.204	.011	.005	.067	.067	.067	.037			—	—	—			
62	68.41	16.08	2.12	1.44	1.14	3.52	4.52	2.24	0.33						99.84	
A3. III	1.140	.157	.013	.020	.029	.062	.072	.020								
63	67.30	17.55	1.47	1.67	1.04	3.48	3.90	2.13	0.80			0.13			99.47	
A3. III	1.122	.172	.009	.024	.026	.063	.063	.022				.001				
64	63.19	18.65	4.01	1.89	1.20	4.86	3.69	1.95	0.07		0.18	0.25	0.13		100.07	
A2. II	1.053	.183	.025	.027	.030	.088	.059	.021			.002	.002	.002			
65	63.18	19.79	1.10	3.23	1.51	4.04	5.12	2.42	0.62						101.01	
B3. IV	1.053	.194	.007	.044	.035	.072	.082	.026								
66	60.71	18.53	2.02	2.16	1.26	5.66	4.82	1.93	2.45		0.77	0.22	trace	Cl S SrO	trace trace trace	100.53
A2. II	1.012	.182	.013	.030	.032	.101	.077	.020			.019	.002	—			
67	65.7	17.2	1.0	2.8	1.6	4.7	3.4	2.5	0.9						99.8	
B3. IV	1.095	.169	.006	.039	.040	.084	.055	.027								
68	66.88	15.69	0.80	2.94	1.17	3.80	3.79	2.80	1.47		0.50	0.15	0.06	S	0.02	100.07
A2. II	1.115	.154	.005	.041	.029	.068	.061	.030			.006	.001	—			
69	66.64	17.02	0.67	2.55	2.24	3.55	3.88	2.06	0.44		0.88	0.06	trace	CO ₂ Li ₂ O	0.03 trace	100.02
A2. II	1.111	.167	.004	.036	.056	.064	.063	.022			.011	—	—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
55	I''(3)4.3.4.	Q 30.36 hy 3.26 or 9.45 mt 3.94 ab 28.30 an 19.74 C 1.73	Gustavia, St. Barthelemy, West Indies.	P. T. Cleve.	P. T. Cleve, Sver. Vets. Ak. Hndl., IX, No. 12, p. 35, 1871.	Syenite porphyry.	Cf. A. G. Högbom, B. G. Inst., Ups., VI, p. 230, (1903), 1905.
56	I(II)4.3''4.	Q 24.42 di 0.68 or 8.34 hy 6.81 ab 29.34 mt 2.32 an 28.08 il 0.76	Eruption of Aug. 30, 1902, Mont Pelée, Martinique.	Pisani.	A. Lacroix, Mont Pelée, p. 531, 1904.	Andesite ash.	Collected on Guadeloupe.
57	I''4.3''4''.	Q 24.54 hy 7.28 or 6.67 mt 3.71 ab 29.34 il 0.61 an 24.46 ap 0.34 C 2.24	Eruption of Jan. 25, 1903, Mont Pelée, Martinique.	Pisani.	A. Lacroix, Mont Pelée, p. 531, 1904.	Andesite ash.	
58	I''4.3.4.	Q 18.72 hy 3.62 or 10.56 mt 3.48 ab 31.44 il 0.61 an 28.08 ap 0.34 C 1.12	Parnasse, Martinique, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Hypersthene andesite.	
59	I''(3)4.3.4.	Q 30.48 hy 6.25 or 8.90 mt 0.93 ab 26.72 il 0.61 an 21.41 C 4.49	Essequibo River, (average sample), British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 34, 1900.	Granitite gneiss.	Also in G. Goldf. Br. Gui., p. 39, 1908. In W. T., p. 191.
60	I(II)4.''3.4.	Q 23.22 hy 6.91 or 13.34 mt 3.48 ab 33.01 il 0.76 an 17.51 ap 0.34 C 0.31	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Br. Gui., p. 60, 1908.	Granitite.	In W. T., p. 191.
61	I''4''(2)3.(3)4.	Q 13.44 hy 6.70 or 20.57 mt 1.16 ab 35.11 hm 0.96 an 18.63 C 3.37	Sericambra, Demerara River, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Br. Gui., p. 77, 1908.	Syenite.	In W. T., p. 191.
62	I''4.(2)3.4.	Q 24.60 hy 3.82 or 12.79 mt 3.02 ab 37.73 an 17.44	Paramo, Azuiral de Tuquerres, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 159, 1892.	Dacite.	In W. T., p. 191.
63	I''4.''3.4.	Q 27.06 hy 4.58 or 12.23 mt 2.09 ab 33.01 ap 0.34 an 16.68 C 2.75	Paramo, Azuiral de Tuquerres, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 155, 1892.	Dacite.	In W. T., p. 191.
64	I(II)4.3.4.	Q 22.74 hy 3.26 or 11.68 mt 5.80 ab 30.92 il 0.30 an 22.52 ap 0.67 C 2.14	Monte Tajumbina, Peru.	C. Hoepfner.	C. Hoepfner, In, Diss. Halle, p. 32, 1881.	Dacite.	In W. T., p. 191.
65	I(II)4(5).(2)3.4.	Q 11.34 hy 8.38 or 14.46 mt 1.62 ab 42.97 an 20.02 C 1.43	Gualilan, San Juan Province, Argentina.	B. Wetzig.	A. Stelzner, Btr. G. Arg. Rep., I, p. 186, 1885.	Dacite.	In W. T., p. 191.
66	I(II)4(5).3.4.	Q 13.14 di 1.94 or 11.12 hy 2.30 ab 40.35 mt 2.55 an 23.63 il 2.89 hm 0.32	Rio Blanco, Rioja, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 613, 1906.	Diorite porphyrite.	
67	I(II)4.3.''4.	Q 21.72 hy 8.36 or 15.01 mt 1.39 ab 28.82 an 23.35 C 0.31	Vallée de Brousset, Pic du Midi d'Ossan, Pyrenees.	Not stated.	J. de Lapparent, B. Soc. Min. Fr., XXXIV, p. 292, 1911.	Quartz microdiorite.	
68	I(II)4.''3.''4.	Q 22.74 hy 6.99 or 16.68 mt 1.16 ab 31.96 il 0.91 an 18.07 ap 0.34	Langfirsan, Sala, Sweden.	G. Nyblom.	H. S. Sjögren, G. F. F., XXXII, p. 1371, 1910.	Porphyrite.	
69	I(II)4.''3.4.	Q 23.76 hy 8.37 or 12.23 mt 0.93 ab 33.01 il 1.67 an 17.79 C 1.84	Appmannsberg, Bayrischer Wald, Bavaria.	A. Schwager.	Oebbke and Schwager, Geogn. Jhft., XIV, p. 249, 1901.	Granite- diorite.	

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
70	64.78	17.45	1.53	2.35	2.04	4.07	3.12	1.83	1.97		1.07		0.03	S 0.13	100.37	
A2. II	1.080	.171	.009	.083	.051	.073	.050	.019			.013		—			
71	61.93	18.83	3.24	1.24	2.37	4.46	4.16	2.76	1.83						100.78	2.62
A3. III	1.032	.185	.020	.017	.059	.080	.067	.030								
72	59.44	18.97	5.25	1.72	0.85	6.85	3.08	2.46	1.22						99.84	2.65
A3. III	.991	.186	.033	.024	.021	.122	.050	.027								
73	68.91	14.70	0.87	1.35	1.61	2.99	3.65	2.80	1.03	0.60	trace		0.87		99.39	2.67
B3. IV	1.149	.144	.005	.019	.040	.054	.059	.030			—		.012			
74	70.02	16.52	0.41	2.69	1.04	3.86	3.49	1.78	0.41		trace	0.47	trace	S 0.03	100.82	
B3. IV	1.167	.162	.003	.038	.026	.069	.056	.019			—	.003	—			
75	64.85	16.67	2.81	1.96	1.87	4.51	3.79	2.75	0.52		0.34	trace			100.07	
A3. III	1.081	.163	.018	.027	.047	.080	.061	.029			.004	—				
76	67.10	15.87	1.67	1.98	1.32	3.12	3.90	2.04	1.66		0.59	0.21	0.14	F BaO Li ₂ O 0.20 0.06 0.03	99.89	
A1. I	1.118	.156	.010	.028	.033	.055	.063	.021			.007	.001	.002			
77	61.59	18.91	1.57	2.44	1.61	5.06	4.46	1.87	1.25		1.18	0.22	0.16	BaO Li ₂ O 0.09 0.01	100.42	
A2. II	1.027	.185	.010	.034	.040	.090	.072	.020			.015	.002	.002			
78	68.83	16.45	0.92	2.16	0.96	3.08	3.36	2.12	1.70					S 0.05	100.36	
A3. III	1.147	.161	.006	.020	.024	.055	.054	.022								
79	65.44	17.73	1.17	3.45	1.45	3.99	3.58	2.17	1.18		0.39		0.18		100.73	
A2. II	1.091	.174	.008	.048	.036	.071	.058	.023			.005		.003			
80	63.62	17.72	3.24	3.40	1.49	4.83	2.29	1.99	1.09						99.67	
A3. III	1.060	.174	.020	.048	.037	.086	.037	.021								
81	66.35	17.47	0.33	3.23	1.03	4.18	3.80	3.41	0.31		0.66				100.77	
A3. III	1.106	.171	.002	.044	.026	.075	.061	.036			.008					
82	60.14	16.65	2.94	2.39	1.16	5.21	3.41	2.51	3.98	0.54	0.62	0.07	0.06		99.68	
A2. II	1.002	.163	.018	.033	.029	.093	.055	.027			.008	.001	—			
83	67.98	14.39	3.73	0.62	1.58	2.86	3.58	1.86	1.74			0.07	1.19	SO ₃ NiO CuO none none 0.04	99.64	
A2. II	1.133	.141	.023	.009	.040	.051	.058	.020				—	.017			
84	63.97	19.12	2.42	1.93	1.05	4.55	4.21	1.89	0.46						99.60	
A3. III	1.066	.187	.015	.026	.026	.081	.068	.020								
85	67.34	15.96	3.38	0.80	0.88	2.98	4.12	1.66	2.20		0.56				99.78	2.462
A3. III	1.122	.156	.021	.011	.022	.053	.066	.018			.007					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
70	I(II)''4.3.4.	Q 28.08 hy 6.55 or 10.56 mt 2.09 ab 26.20 il 1.98 an 20.29 C 2.96	Hauzenberg, Bayrischer Wald, Bavaria.	G. Vervnert.	A. Frentzel, Geogn. Jhft., XXIV, p. 166, 1911.	Diorite porphyrite.	
71	I(II)''4''3.4.	Q 13.86 hy 5.90 or 16.68 mt 3.94 ab 35.11 hm 0.48 an 22.24 C 0.82	Kesselsdorf, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 750, 1886.	Porphyry.	In W. T., p. 191.
72	I(II)4.3''(3)4.	Q 16.62 di 2.81 or 15.01 hy 0.80 ab 26.20 mt 5.57 an 30.30 hm 1.44	Kaufbach, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 754, 1886.	Porphyrite.	In W. T., p. 191.
73	I''4.(2)3''4.	Q 20.46 hy 7.43 or 16.68 mt 1.16 ab 30.92 an 15.01	Böhuliby, Eule, Bohemia.	H. L. Barvir.	H. L. Barvir, Ref. N. J., 1904, I, p. 49.	Porphyry.	
74	I''(3)4.3.4.	Q 32.28 hy 7.22 or 10.56 mt 0.70 ab 29.34 ap 1.01 an 16.40 C 2.86	Dutsch-Branitz, Brünn, Moravia.	C. von John.	von John and Suess, Jb. G. R.-A., Wien, LVIII, (1), p. 249, 1908.	Granitite.	
75	I(II)4.3''4.	Q 20.16 di 1.54 or 16.12 hy 4.63 ab 31.96 mt 4.18 an 20.29 il 0.61	Vaskó, Com. Krasso-Szoreny, Hungary.	K. Emszt.	Rozlozsnik and Emszt, Mt. Ung. G. A., XVI, p. 187, 1908.	Banatite.	
76	I''''4.(2)3.4.	Q 27.84 hy 5.02 or 11.68 mt 2.32 ab 33.01 il 1.06 an 14.46 ap 0.34 C 2.04	Mount Goryczkowzy, Posredni, Tatra Mountains, Hungary.	Z. Weyberg.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Granite.	
77	I(II)4''3.4.	Q 15.48 hy 5.45 or 11.12 mt 2.32 ab 37.73 il 2.28 an 23.07 ap 0.67 C 1.02	Suchy Kondracki, Tatra Mountains, Hungary.	Z. Weyberg.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Granitite.	
78	I''(3)4''3.4.	Q 31.98 hy 5.57 or 12.23 mt 1.39 ab 28.30 an 15.29 C 3.06	Koflaster Alp, Ultenthal, Tyrol.	C. von John.	W. Hammer, Jb. G. R.-A., Wien, LIII, p. 79, 1904.	Quartz porphyrite.	
79	I(II)4.3.4.	Q 23.34 hy 8.62 or 12.79 mt 1.86 ab 30.39 il 0.76 an 19.74 C 2.24	Adamello, Tyrol.	Z. Weyberg.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Tonalite.	
80	I(II)''4.3(4)(3)4.	Q 28.38 hy 7.40 or 11.68 mt 4.64 ab 19.39 an 23.91 C 3.06	Monte Colmo, Adamello, Tyrol.	C. Riva.	C. Riva, Ref. N. J., 1897, II, p. 65.	Quartz porphyrite.	In W. T., p. 191.
81	I''4''3.(3)4.	Q 18.90 di 0.25 or 20.02 hy 6.96 ab 31.96 mt 0.46 an 20.57 il 1.22	Nuoro, Sardinia.	C. Riva.	C. Riva, Att. Ac. Sc. Nap., (2), XII, No. 9, p. 28, 1905.	Granitite.	
82	I(II)4.3''4.	Q 18.12 di 2.00 or 15.01 hy 2.99 ab 28.82 mt 4.18 an 22.52 il 1.22 ap 0.34	Monte Furru, n. Bosa, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVI, p. 587, 1913.	Vitroandes- ite.	Not described.
83	I(II).(3)4.(2)3.4.	Q 31.20 hy 4.40 or 11.12 mt 5.34 ab 30.39 an 14.18 C 1.22	Werkh Issetsk, Mursinsky, Ural Mountains.	G. Katerfeld.	W. Nikitin, Mém. Com. G. Russ., XXII, p. 95, 1907.	Granite.	MnO high.
84	I''4.3.4.	Q 20.34 hy 4.05 or 11.12 mt 3.48 ab 35.63 an 22.52 C 1.84	Dewdorak Glacier, Kasbek, Caucasus.	Sewastjanow.	F. L.-Lessing, Mat. G. Russ., XXI, p. 107, 1901.	Andesite- dacite.	
85	I''''4.(2)3.4.	Q 29.40 hy 2.20 or 10.01 mt 0.93 ab 34.58 il 1.06 an 14.73 hm 2.72 C 1.94	Kolantzikiki, Megara, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Dacite.	In W. T., p. 191.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
86	64.83	17.60	4.95	1.82	1.61	5.26	2.52	1.53	0.20		0.08				100.40	2.539
A3. III	1.081	.172	.031	.025	.040	.094	.041	.016			.001					
87	67.27	16.31	3.13	1.15	0.84 _a	3.48	3.61	2.91	1.16		0.40				100.26	
A3. III	1.121	.160	.019	.016	.021	.063	.058	.031			.005					
88	68.61	16.08	1.03	1.60	1.00	3.48	3.62	3.07	0.18	0.31	0.59	0.20			99.77	
A2. II	1.144	.158	.006	.022	.025	.063	.058	.033			.007	.001				
89	65.52	17.17	4.16	0.12	1.18	3.52	3.32	2.23	2.66				0.13		100.01	2.59
A3. III	1.092	.168	.026	.002	.030	.063	.054	.024					.002			
90	62.80	20.42	3.99	0.45	1.86	4.04	3.78	1.82	0.52				0.17		99.85	2.63
A3. III	1.047	.200	.025	.007	.047	.072	.061	.020					.002			
91	66.30	15.07	0.54	3.26	0.75	3.10	4.14	2.28	4.56						100.00	
A3. III	1.105	.148	.003	.045	.019	.055	.067	.024								
92	64.96	19.12	0.60	2.69	0.81	5.10	4.72	1.48	1.58						101.06	
B3. IV	1.083	.187	.004	.038	.020	.091	.076	.016								
93	62.80	16.70	2.13	4.11	0.84	4.98	2.95	1.22	4.42						100.25	
A3. III	1.047	.164	.013	.057	.021	.089	.048	.013								
94	64.38	16.96	1.72	3.22	1.27	5.20	3.28	1.60	1.52		0.51	trace	0.24	S 0.03	99.93	
A2. II	1.073	.166	.011	.044	.032	.093	.053	.017			.006	—	.003			
95	66.16	15.39	1.25	1.72	0.90	3.47	3.94	2.00	4.94		0.50				100.27	
A3. III	1.103	.151	.008	.024	.023	.063	.064	.021			.006					
96	65.72	15.06	1.35	1.80	1.57	4.18	4.24	1.07	3.77	0.69	0.69				99.93	
A3. III	1.095	.147	.009	.011	.039	.075	.068	.011			.009					
97	62.6	19.5	4.0	0.3	1.4	4.5	3.9	2.4	0.9						99.5	
B3. IV	1.043	.191	.025	.004	.035	.080	.063	.025								
98	69.4	15.9	1.2	2.2	1.1	3.4	4.2	2.3	1.0						100.7	
B3. IV	1.157	.156	.008	.031	.025	.061	.068	.024								
99	68.51	15.96	2.61	1.09	1.07	3.14	4.01	1.82	n. d.		0.82		0.28	Sol. salts 1.34	100.65	2.329
A2. II	1.142	.156	.016	.015	.027	.056	.064	.020			.010		.004			
100.	65.04	14.01	4.47	2.82	1.20	3.34	4.23	0.97	2.74		0.62				99.44	
A3. III	1.084	.137	.028	.039	.030	.060	.068	.010			.008					

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
86	I.(3)4.3(4).4.	Q 30.66 hy 4.00 or 8.90 mt 5.57 ab 21.48 il 0.15 an 26.13 hm 1.12 C 2.12	Panagia, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Dacite.	In W. T., p. 191.
87	I''4.''3.''4.	Q 26.40 hy 2.10 or 17.24 mt 2.55 ab 30.39 il 0.76 an 17.51 hm 1.28 C 0.82	Island of Cos, Aegean Sea.	F. Millosevich.	F. Millosevich, Rend. Ac. Linc., XXI, p. 310, 1912.	Dacite.	
88	I''4.(2)3.(3)4.	Q 26.46 hy 4.08 or 18.35 mt 1.39 ab 30.39 il 1.06 an 16.68 ap 0.34 C 0.71	Andriantana, Madagascar.	Not stated.	A. Lacroix, pers. com., 1913.	Granite.	
89	I''4.4.3.4.	Q 28.08 hy 3.00 or 13.34 mt 0.93 ab 28.30 hm 3.52 an 17.51 C 2.75	Chrebet, Bjelyi Range, Kamchatka.	Not stated.	K. Bogdanovich, Pet. Mitth., L, p. 123, 1904.	Dacite.	
90	I''4.3.4.	Q 22.20 hy 4.70 or 11.12 mt 2.09 ab 31.96 hm 2.56 an 20.02 C 4.79	Choa-schen Volcano, Kamchatka.	Not stated.	K. Bogdanovich, Pet. Mitth., L, p. 98, 1904.	Andesite	
91	I''4.(2)3.4.	Q 23.28 hy 7.44 or 13.34 mt 0.70 ab 35.11 an 15.29 C 0.20	Utanobori, Kitami, Hokkaido, Japan.	Takaminé?	G. Soc. Jap., 1884.	Liparite.	
92	I''4.3.4''.	Q 17.70 hy 6.49 or 8.90 mt 0.93 ab 39.82 an 25.30 C 0.41	Oshima, Hokkaido, Japan.	Takaminé?	G. Soc. Jap., 1884.	Dacite.	
93	I(II)''4.3''4.	Q 26.28 hy 7.91 or 7.23 mt 3.02 ab 25.15 an 24.74 C 1.43	Komagatake, Oshima, Hokkaido, Japan.	Takaminé?	G. Soc. Jap., 1884.	Andesite pumice.	
94	I(II).4.3''4.	Q 24.30 hy 7.16 or 9.45 mt 2.55 ab 27.77 il 0.91 an 25.85 C 0.31	Hakachi, Mihamamura, Izu, Japan.	T. Ohashi.	S. Kozu, pers. com., 1913.	Dacite.	
95	I''4.''3.4.	Q 26.04 hy 3.62 or 11.68 mt 1.86 ab 33.54 il 0.91 an 17.15 C 0.31	Soengi Sebelit, n. Kebijan, Muller Moun- tains, Borneo.	M. Dittrich.	J. Schmutzer, Jh. K. Ac. Wet. Amst., 1908, p. 400.	Dacite.	
96	I''4.3.4(5).	Q 26.34 di 1.51 or 3.12 hy 3.20 ab 35.63 mt 0.46 an 18.90 il 1.37 hm 1.12	Soengi Embahoe, n. Nangah Pemali, Muller Mountains, Borneo.	M. Dittrich.	J. Schmutzer, Jh. K. Ac. Wet. Amst., 1908, p. 406.	Dacite.	
97	I''4.3.4.	Q 19.20 hy 3.50 or 13.90 mt 0.93 ab 33.01 hm 3.36 an 22.24 C 2.35	Sago Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 25, 1903.	Andesite.	
98	I''4.(2)3.4.	Q 25.92 hy 5.84 or 13.34 mt 1.86 ab 35.63 an 16.96 C 0.31	Eruption of 1883, Krakatoa.	T. H. Waller.	J. W. Judd, Rep. Erup. Krak. R. Soc., p. 38, 1888.	Andesite pumice.	Not in W. T.
99	I''4.(2)3.4.	Q 29.94 hy 2.70 or 11.12 mt 2.09 ab 33.54 il 1.52 an 15.57 hm 1.12 C 1.63	Eruption of 1883, Krakatoa.	C. Winkler.	R. D. M. Verbeek, Krakatau, p. 292, 1884.	Andesite pumice.	In W. T., p. 193.
100	I(II)''4.''3.4(5).	Q 27.84 di 0.22 or 5.56 hy 3.30 ab 35.63 mt 6.50 an 16.40 il 1.22	Eruption of 1883, Krakatoa.	A. Renard.	R. D. M. Verbeek, Krakatau (French ed.), p. 320, 1885.	(Andesite) Ash.	Not in W. T.

CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. COLORADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
101	64.19	17.18	4.08	1.58	2.10	4.95	3.65	1.07	1.81		0.60				100.39	2.64
A3. III	1.070	.168	.026	.010	.053	.089	.059	.011			.008					
102	65.80	16.87	3.97	1.08	1.76	3.16	2.54	1.05					trace		99.68	
A3. III	1.097	.165	.025	.015	.044	.056	.027						—			
103	67.56	16.39	1.25	1.86	1.48	5.08	3.54	1.77		0.17			0.79		99.89	2.678
A3. III	1.126	.160	.008	.026	.037	.091	.057	.020					.011			
104	65.55	16.77	2.24	1.58	2.57	2.90	3.58	1.96	1.28	0.55	0.69	0.06	0.06	CO ₂ none SO ₃ 0.03	99.82	
A2. II	1.093	.164	.014	.022	.064	.052	.058	.021			.008	—	—			
105	60.65	19.55	2.39	1.16	1.16	7.40	4.27	1.98	0.87		0.35		0.08		99.86	
A2. II	1.011	.192	.015	.016	.029	.132	.069	.021			.004		.001			
106	66.39	17.62	1.01	2.21	1.32	3.79	4.49	2.13	0.39		0.33				99.68	
A3. III	1.107	.173	.006	.030	.033	.068	.073	.022			.004					

RANG 3. ALKALICALCIC. COLORADASE.

1	65.02	18.37	1.21	2.06	1.49	6.20	3.96	0.64	0.42	0.09	0.33	0.14	0.09	CO ₂ none BaO trace	100.02	
A2. II	1.084	.180	.008	.029	.037	.111	.064	.007			.004	.001	.001			
2	69.66	17.57	0.21	1.04	0.58	4.54	4.91	0.71	0.50	0.05	0.21	0.03	trace	CO ₂ none FeS ₂ trace NiO none BaO 0.03 SrO 0.05 Li ₂ O none	100.09	
A1. I	1.161	.172	.001	.014	.015	.081	.079	.008			.003	—	—			
3	68.14	17.00	2.84	0.22	1.07	3.83	4.94	0.83	1.06		0.52				100.45	
A3. III	1.136	.167	.018	.003	.027	.068	.080	.009			.007					
4	63.51	18.07	3.22	1.09	2.19	5.14	4.08	0.88	0.60	1.07	0.33	0.19	0.06	CO ₂ none ZrO ₂ none Cl 0.01 F none S 0.01 V ₂ O ₅ trace BaO 0.03	100.48	2.52
A1. I	1.059	.177	.020	.015	.055	.092	.066	.009			.004	.001	—			
5	68.12	19.66	0.18	n. d.	none	4.67	6.38	0.69	0.29						99.99	2.61
A3. III	1.135	.193	.001	(.002)	—	.084	.103	.007								
6	70.96	16.64	0.22	1.48	1.29	3.46	4.59	0.24	0.68		0.38	0.01	0.10	CO ₂ 0.42 S trace	100.47	2.737
A2. II	1.178	.163	.001	.021	.032	.061	.074	.002			.005	—	.001			
7	64.28	15.47	3.04	3.51	trace	5.02	3.46	0.55	4.68						100.01	
A3. III	1.071	.152	.019	.049	—	.089	.056	.006								
8	68.11	15.77	0.11	2.99	1.75	3.79	4.58	0.76	0.86	0.11	0.74	0.28	0.16	CO ₂ 0.21 FeS ₂ 0.17	100.39	2.74
A2. II	1.135	.155	.001	.042	.044	.068	.074	.008			.009	.002	.002			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4. DOSODIC. YELLOWSTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
101	I(II).4.3.4''.	Q 25.14 hy 5.30 or 6.12 mt 0.46 ab 30.92 il 1.22 an 24.74 hm 3.84 C 0.92	Kampong Dijah, Sumbawa.	Tielmans.	G. Rack, N. J. B. B., XXXIV, p. 47, 1912.	Dacite.	
102	I(II).4.(2)3.''4.	Q 26.48 hy 4.40 or 15.01 mt 3.48 ab 29.34 hm 1.60 an 15.57 C 2.65	Healesville, Macedon, Victoria.	H. C. Jenkins.	J. W. Gregory, Pr. R. Soc. Vict., XIV, p. 201, 1902.	Dacite.	
103	I(II).4.3.4.	Q 25.44 di 1.83 or 11.12 hy 6.63 ab 29.87 mt 1.86 an 23.07	Moruya, New South Wales.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XVI, p. 42, 1883.	Granite.	In W. T., p. 193.
104	I(II).''4.(2)3.4.	Q 27.06 hy 6.40 or 11.68 mt 3.25 ab 30.39 il 1.22 an 14.46 C 3.37	McMahon Creek, Maimai, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Quartz porphyry.	
105	I(II).4(5).3.4.	Q 12.48 di 6.26 or 11.68 wo 0.12 ab 36.15 mt 3.02 an 28.36 il 0.61 hm 0.48	Paritutu, Taranaki, New Zealand.	J. S. MacLaurin.	E. D. Clarke, G. S. N. Z. B. 14, p. 23, 1912.	Andesite.	
106	I''4.''3.4.	Q 20.88 hy 5.94 or 12.23 mt 1.39 ab 38.25 il 0.61 an 18.90 C 1.02	Sounding, Lat 70°S., Lon. 81°W(Paris), Antarctica.	Lassieur.	E. Gourdon, pers. com., 1913.	Quartz diorite.	Dredged block.

SUBRANG 5. PERSODIC. AMADOROSE. (C. I. P. W., 1902.)

1	I''4.3(4).(4)5.	Q 23.22 hy 6.06 or 3.89 mt 1.86 ab 33.54 il 0.61 an 30.02 ap 0.34	Monson, Hampden County, Massachusetts.	W. F. Hille- brand.	T. N. Dale, U. S. G. S. B. 470, p. 259, 1911.	Monzonite gneiss.	
2	I.4.3.''5.	Q 27.12 hy 2.82 or 4.45 mt 0.23 ab 41.40 il 0.46 an 22.52 C 0.41	Tuolumne River, Amador County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 702, 1896.	Quartz diorite aplite.	In W. T., p. 193.
3	I.4.''3.(4)5.	Q 26.34 hy 2.70 or 5.00 mt 0.93 ab 41.92 il 0.46 an 18.90 hm 2.24 C 1.02	Ventura quadrangle, California.	R. C. Wells.	J. A. Pemberton, U. S. G. S. rec. lab.	Igneous rock.	
4	I(II).4.3.(4)5.	Q 22.20 hy 5.50 or 5.00 mt 2.78 ab 34.58 il 0.61 an 25.58 hm 1.28 C 1.02 ap 0.34	Cocooi Island, Panama.	R. C. Wells.	R. D. McDonald, U. S. G. S. rec. lab.	Dacite porphyry.	
5	I.4''.''3.''5.	Q 18.42 hy 0.26 or 3.89 ab 53.97 an 23.07 C 0.10	Reef Island. East of Tortola, West Indies.	A. Bygden.	A. Bygden, B. G. Inst. Ups., VII, p. 9, (1905), 1906.	Oligoclase graphic granite.	
6	I''.(3)4.3.5.	Q 32.58 hy 5.18 or 1.11 mt 0.46 ab 38.78 il 0.76 an 16.96 C 2.65	Potaro River (average sample), British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 52, 1900.	Porphyrite.	Also in G. Goldf. Br. Gui., p. 61, 1908. In W. T., p. 193.
7	I''.''4.3''.(4)5.	Q 29.46 hy 3.96 or 3.34 mt 4.41 ab 29.34 an 24.74 C 0.10	Chibishinai, Kunishiri, Chishima, Japan.	Takaminé?	G. Soc. Jap., 1884.	Andesite.	
8	I(II).4.''3.(4)5.	Q 26.58 hy 8.89 or 4.45 mt 0.23 ab 38.77 il 1.37 an 16.96 ap 0.67 C 1.22	Ravensthorpe, Phillips River District, West Australia.	E. S. Simpson.	Simpson and Glanert, W. Aust. G. S. B. 35, p. 21, 1909.	Granite.	

CLASS I. PERSALANE—Continued.

RANG 4. DOCALCIC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	60.10	18.93	4.15	2.70	1.77	6.94	3.32	1.01	0.62		0.54	0.16			99.96	
A2. II	1.002	.186	.026	.038	.044	.124	.053	.011			.007	.001				
2	61.97	18.98	4.19	2.29	1.95	7.07	2.95	1.02	0.19		trace	trace			100.61	2.579
A3. III	1.033	.186	.026	.032	.049	.127	.048	.011			—	—				
3	63.09	18.89	3.48	2.02	1.97	6.18	3.14	1.30	0.63						100.70	
A3. III	1.052	.185	.022	.028	.049	.111	.051	.014								
4	54.02	14.82	7.12	2.67	5.64	9.07	2.63	0.71	1.92		1.60	trace	trace		100.20	
A3. III	.900	.145	.044	.037	.141	.163	.042	.008			.020	—	—			

CLASS I. PERSALANE.

RANG 1. PERALKALIC. NORDMARKASE. (C. I. P. W., 1902.)

1	62.03	16.39	0.72	0.86	1.60	3.60	1.08	12.38	0.61	0.24	0.53	0.13			100.17	
A2. II	1.034	.161	.005	.012	.040	.064	.018	.132			.007	.001				

RANG 1. PERALKALIC. NORDMARKASE.

1	65.52	16.49	0.14	0.18	0.11	0.76	1.89	10.87	0.23	0.09	none	0.12	0.06	CO ₂ 0.07 ZrO ₂ none SO ₃ trace Cl 0.02 FeS ₂ 1.08 Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.08 SrO trace CuS 0.78 ZnO 1.01 PbS 0.78	100.28	2.633
A1. I	1.092	.161	.001	.003	.003	.014	.031	.116			—	.001	—			

RANG 1. PERALKALIC. NORDMARKASE.

1	65.42	15.80	2.75	0.91	0.53	1.33	5.18	6.26	2.46						100.64	
A3. III	1.090	.155	.017	.013	.013	.024	.084	.067								
2	64.15	19.04	1.02	0.93	0.37	1.37	5.37	7.10	0.27			0.10	0.16		100.58	
A2. II	1.069	.187	.006	.013	.009	.025	.087	.076				.001	.002			
3	65.43	16.11	1.15	2.85	0.40	1.49	5.00	5.97	0.39	0.19	0.50	0.13	0.23	ZrO ₂ 0.11 Cl 0.05 F 0.08 FeS ₂ 0.07 BaO 0.03	100.18	
A1. I	1.091	.158	.009	.039	.010	.027	.081	.064			.008	.001	.003			
4	64.88	16.24	1.37	2.70	0.89	1.92	5.00	5.61	0.46	0.19	0.69	0.13	0.14	CO ₂ none ZrO ₂ 0.13 Cl 0.04 F 0.08 FeS ₂ none NiO none BaO 0.06	100.53	
A1. I	1.081	.159	.008	.038	.022	.034	.081	.060			.009	.001	.002			
5	63.71	18.30	2.08	2.52	0.09	1.18	6.39	6.21	0.17	0.09	trace		trace		100.74	
A3. III	1.062	.180	.013	.035	.002	.021	.103	.065			—		—			
6	61.05	18.81	2.02	3.06	0.42	1.30	6.56	6.02	0.78		0.34		trace	BaO none	100.04	2.655 12°
A3. III	1.018	.183	.013	.043	.011	.023	.106	.064			.004		—			

ORDER 4. QUARDOFELIC. BRITANNARE—Continued.

SUBRANG 4-5. PRESODIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I(II).4.(3)4.4''.	Q 19.38 di 0.43 or 6.12 hy 4.86 ab 27.77 mt 6.03 an 33.92 il 1.06	Vallée aux Ecrevisses, Martinique, West Indies.	Pisani.	A. Lacroix, Mont. Pelée, p. 573, 1904.	Andesite.	
2	I(II).4.''4.4.	Q 22.20 hy 5.69 or 6.12 mt 6.03 ab 25.15 an 35.31	Paluquillo, Guamani Volcano, Ecuador.	Tietze.	E. Esch in W. Reiss, Ecuador, I, p. 106, 1901.	Andesite.	
3	I(II).4.(3)4.4.	Q 23.10 hy 5.69 or 7.78 mt 5.10 ab 26.72 an 30.86 C 0.92	Wistra, Carinthia.	H. Krczmar.	F. Becke, T. M. P. M., XVIII, p. 94, 1899.	Tonalite gneiss.	In W. T., p. 193.
4	I''4.(3)4.4''.	Q 12.06 di 14.69 or 4.45 hy 7.30 ab 22.01 mt 3.94 an 26.41 il 3.04 hm 4.32	Tumleo, Kaiser Wilhelm Land, New Guinea.	E. Ludwig.	S. Richarz, N. J. B. B., XXIX, p. 445, 1910.	Andesite.	

ORDER 5. PERFELIC. CANADARE. (C. I. P. W., 1902.)

SUBRANG 1. PERPOTASSIC. HETTOSE. (C. W. WRIGHT, 1915.)

1	I(II).5.1''.1(2).	Q 1.32 di 8.64 or 73.39 wo 1.16 ab 9.43 mt 1.16 an 3.06 il 1.06 ap 0.34	Tombs Basin, Copper Mountain Area, Prince of Wales Island, Alaska.	C. Palmer.	C. W. Wright, U. S. G. S. P. P. 87, 1915, p. 40.	Orthoclasite.	
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SUBRANG 2. DOPOTASSIC.

1	I.(4)5.1''.2.	Q 10.98 hy 0.56 or 64.50 mt 0.23 ab 16.24 ap 0.34 an 3.06 pr 1.08 C 0.31	Rupee Mine, Broken Hill, New South Wales.	H. P. White.	D. Mawson, Mem. R. Soc. S. Aust., II (4), p. 297, 1912.	Pegmatite.	
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SUBRANG 3. SODIPOTASSIC. PHLEGROSE. (C. I. P. W., 1902.)

1	I''.(4)5.1.3.	Q 8.58 di 2.81 or 37.25 wo 0.81 ab 44.01 mt 3.02 an 1.11 hm 0.64	Bristol Township, Porcupine Area, Ontario.	Not stated.	A. G. Burrows, Rep. Bur. Min. Ont., XXI, (1), p. 218, 1912.	Granite porphyry.	
2	I.5.1.3.⊙.	Q 3.66 hy 2.09 or 42.26 mt 1.39 ab 45.59 ap 0.34 an 1.67 C 1.84	Monmouth Town- ship, Ontario.	N. N. Evans.	Adams and Barlow, Tr. R. Soc. Can., II, (4), p. 30, 1909.	Nephelite syenite.	Also in Can. G. S. Mem. 6, p. 259, 1910.
3	I(II).(4)5.1(2).3.	Q 8.82 di 2.64 or 35.58 hy 3.21 ab 42.44 mt 2.09 an 3.61 il 0.91 ap 0.34	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 59, 1903.	Nordmarkite.	In W. T., p. 193.
4	I(II).(4)5.1(2).3''.	Q 8.46 di 3.03 or 33.36 hy 3.71 ab 42.44 mt 1.86 an 5.00 il 1.37 ap 0.34	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 59, 1903.	Nordmarkite.	In W. T., p. 193.
5	I''.5.1''.3(4).	Q 0.42 di 2.20 or 36.14 hy 1.95 ab 53.97 mt 2.32 an 3.34	Salem Neck, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VI, p. 806, 1898.	Pulaskite.	In W. T., p. 193.
6	I''.5.1''.3(4).	or 35.58 di 2.38 ab 47.68 ol 2.50 an 3.61 mt 3.02 ne 4.26 il 0.61	Coney Island, Salem Harbor, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VII, p. 118, 1899.	Sölvbergite.	Cf. No. 7, 1.5.1.4. In W. T., p. 193.

CLASS I. PERSALANE—Continued.

RANG I. PERALKALIC. NORDMARKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	60.13	20.03	2.36	1.33	0.76	0.87	6.30	5.97	1.41	0.16	1.15	0.06	trace	CO ₂ ZrO ₂ SO ₃ none 0.05 0.14	100.72	
A1. I	1.002	.196	.015	.018	.019	.016	.102	.064			.014	—	—			
8	64.51	16.75	2.05	1.00	0.60	1.38	6.08	5.74	0.46	0.31	0.75	0.14	0.21	Cl 0.04	100.02	
A2. II	1.075	.164	.013	.014	.015	.025	.098	.061			.009	.001	.003			
9	66.22	16.22	1.98	0.16	0.77	1.32	6.49	5.76	0.24	0.08	0.22	0.10	trace	SO ₃ Cl F BaO SrO 0.02 0.04 trace 0.29 0.06	99.97	
A1. I	1.104	.159	.012	.002	.019	.023	.105	.062			.003	.001	—			
10	66.03	18.49	2.18	0.22	0.39	0.96	5.22	5.86	0.85			0.04	trace	CO ₂ trace	100.24	
A3. III	1.101	.181	.014	.003	.010	.017	.084	.063				—	—			
11	68.96	15.42	1.99	0.16	0.22	0.25	6.59	5.48	0.30	0.22	0.12	trace	0.07	CO ₂ ZrO ₂ SO ₃ Cl BaO SrO 0.13 0.04 none 0.01 trace none	99.96	
A1. I	1.149	.151	.013	.002	.006	.004	.106	.059			.002	—	.001			
12	62.59	17.23	1.51	2.02	1.30	1.99	5.50	6.74	0.30		0.54	0.11		CO ₂ SO ₃ Cl trace trace trace	99.83	
A2. II	1.043	.169	.009	.028	.033	.036	.089	.071			.007	.001				
13	68.01	17.48	0.41	n. d.	0.46	trace	5.77	7.08	0.73						99.94	2.60
A4. IV	1.134	.171	.003	(.006)	.012	—	.093	.075								
14	60.50	18.20	1.20	1.08	0.26	0.68	5.10	5.23	7.00		0.39				99.64	
A3. III	1.008	.178	.008	.015	.007	.012	.082	.055			.005					
15	53.83	16.08	0.07	1.69	2.47	5.27	5.01	6.16	0.16	0.32	1.01	0.06		CO ₂ 7.69	99.82	
A2. II	.897	.159	—	.024	.062	.095	.081	.066			.175	—				
16	64.54	18.13	2.63	0.97	0.67	0.62	6.60	5.99	0.31		trace	trace	trace	BaO 0.42	100.88	
A3. III	1.076	.178	.016	.013	.017	.011	.106	.064			—	—	—			
17	64.56	16.22	2.87	1.73	0.63	1.21	5.61	5.77	0.18		0.90	0.16	0.12	S 0.03	99.99	
A2. II	1.076	.159	.018	.024	.016	.021	.090	.062			.011	.001	.002			
18	62.93	16.40	4.47	1.56	0.31	0.65	3.60	8.51	0.37		0.85	0.23	0.01	S 0.02	99.91	
A2. II	1.049	.161	.028	.022	.008	.012	.058	.090			.011	.002	—			
19	64.83	20.28	0.29	0.14	0.21	1.01	6.10	6.80	0.39	0.05	trace	trace	trace	CO ₂ 0.12	100.22	
A3. III	1.081	.199	.002	.002	.005	.018	.098	.072			—	—	—			
20	63.97	19.90	0.60	0.94	0.16	1.24	5.86	6.44	0.36	0.03	0.24	trace	0.03	CO ₂ 0.05	99.82	
A2. II	1.066	.195	.004	.013	.004	.022	.095	.068			.003	—	—			
21	63.45	15.16	2.50	2.66	1.25	1.29	4.70	6.60	1.32		0.60	0.23	0.15	CO ₂ ZrO ₂ 0.20 0.05	100.16	2.627
A2. II	1.058	.149	.016	.037	.031	.023	.076	.070			.008	.002	.002			

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 3. SODIPOTASSIC. PHLEGROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	I.5.1''3(4).	or 35.58 ol 1.33 ab 49.26 mt 0.93 an 4.45 il 2.13 ne 1.99 hm 1.76 C 1.53	Braddock's quarry, Fourche Moun- tain, Little Rock, Arkansas.	H. S. Washing- ton.	H. S. Washington, J. G., IX, p. 610, 1901.	Foyaite.	In W. T., p. 195.
8	I''5.1.3(4).	Q 4.56 di 3.24 or 33.92 hy 0.58 ab 51.35 mt 1.86 an 1.39 il 1.37 hm 0.80 ap 0.34	Hueco Tanks, El Paso County, Texas.	G. Steiger.	G. B. Richardson, U. S. G. S. Fol. 166, p. 7, 1909.	Syenite porphyry.	
9	I''5.1.3(4).	Q 4.74 ac 3.70 or 34.47 di 4.10 ab 50.83 wo 0.12 il 0.46 hm 0.64 ap 0.34	Gray Butte, Bear Paw Moun- tains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., I, p. 295, 1896.	Quartz syenite porphyry.	In W. T., p. 197.
10	I''(4)5.1(2).3.	Q 10.50 hy 1.00 or 35.03 mt 0.70 ab 44.02 hm 1.76 an 4.73 C 1.73	Game Ridge, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, II, p. 324, 1896.	Trachyte.	Also in Pr. Colo. Sci. Soc., II, p. 237, 1887. In W. T., p. 195.
11	I.(4)5.1.3(4).	Q 10.74 ac 6.01 or 32.80 us 0.12 ab 48.21 di 0.86 hy 0.30 il 0.30	Near Mount Waas, La Sal Moun- tains, Utah.	W. F. Hille- brand.	L. M. Prindle, U. S. G. S. B. 228, p. 191, 1904.	Syenite porphyry.	
12	I(II).5.1.3.	or 39.48 di 5.37 ab 46.83 hy 1.43 an 2.50 ol 0.62 mt 2.09 il 1.06 ap 0.34	Rosslund, British Columbia.	M. Dittrich.	R. M. Brock, Can. G. S. Rep., 1902, p. 104A.	Pulaskite.	Also in R. A. Daly, Can. G. S. Mem. 38, (1), p. 359, 1912
13	I''5.1.3.	Q 6.48 hy 1.99 or 41.70 ab 48.73 C 0.51	Goodwick, n. Fishguard, Pembrokeshire, Wales.	F. E. Tadman.	F. R. C. Reed, Q. J. G. S., LI, p. 177, 1895.	Felsite.	In W. T., p. 195.
14	I.(4)5.1''3(4).	Q 9.18 hy 0.96 or 30.58 mt 1.86 ab 42.97 il 0.76 an 3.34 C 2.96	Mont Dore, Auvergne.	Pisani.	A. Lacroix, C. R., CXLVII, p. 780, 1908.	Trachyte pumice.	Fresh?
15	I.5.1''3.	or 36.70 il 1.98 ab 41.39 RCO ₂ 14.55 an 3.34 ne 0.57	Mount Axpé, n. Bilbao, Spain.	H. S. Washing- ton.	Unpublished.	Calcite trachyte.	Calcite primary?
16	I.5.1.3(4).	Q 1.20 di 0.65 or 35.58 hy 1.40 ab 55.54 mt 3.02 an 2.22 hm 0.48	Lövas Bay, Farrisvand, Norway.	P. Schei.	W. C. Brögger, Eg. Kg., III, p. 198, 1899.	Pulaskite.	In W. T., p. 197.
17	I''5.1.3''.	Q 7.38 di 2.38 or 34.47 hy 0.50 ab 47.16 mt 3.48 an 1.95 il 1.67 hm 0.48 ap 0.34	Parvavara, Gellivare, Sweden.	G. Nyblom.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Syenite.	
18	I''5.1(2)3.	Q 8.58 hy 0.80 or 50.04 mt 2.55 ab 30.39 il 1.67 an 1.39 hm 2.72 C 0.82 ap 0.67	Wällkomman, Gellivare, Sweden.	G. Nyblom.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Syenitic gneiss.	
19	I.5.1(2).3''.	Q 1.20 hy 0.50 or 40.03 mt 0.46 ab 51.35 an 5.00 C 1.12	Laacher See, Rheinland.	R. Brauns.	R. Brauns, N. J. B. B., XXXIV, p. 154, 1912.	Sanidinite.	
20	I.5.1(2).3''.	Q 2.04 hy 1.19 or 37.81 mt 0.93 ab 49.78 il 0.46 an 6.12 C 1.02	Laacher See, Rheinland.	R. Brauns.	R. Brauns, N. J. B. B., XXXIV, p. 148, 1912.	Sanidinite.	
21	I(II)''5.1.3.	Q 7.02 di 2.94 or 38.92 hy 3.65 ab 39.32 mt 3.71 an 0.83 il 1.22 ap 0.67	Haselberg, Ammelshain, Saxony.	C. Amtmann.	C. Amtmann, In. Diss. Leip., p. 49, 1907.	Granite porphyry.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
22	63.24	16.83	4.86	0.07	0.57	0.72	4.02	7.37	1.13			0.16		SO ₃ 0.43	99.40	
B3. IV	1.054	.165	.030	.001	.014	.013	.065	.079				.001				
23	62.87	17.45	1.19	0.79	0.76	2.81	4.23	8.87	0.34		0.36	trace	0.20		99.87	
A2. II	1.048	.171	.008	.011	.019	.050	.068	.095			.005	—	.003			
24	59.24	18.63	3.30	1.20	0.12	2.06	4.87	9.14	0.86		0.56	0.15		CO ₂ none ZrO ₂ 0.10 SO ₃ 0.17 Cl 0.08 BaO 0.06	100.54	2.509
A1. I	.987	.183	.021	.017	.003	.037	.079	.097			.007	.001				
25	61.88	18.06	2.19	1.38	0.61	1.15	6.89	6.72	0.37		0.69	0.07		CO ₂ none ZrO ₂ 0.08 SO ₃ 0.05 Cl 0.30 BaO 0.08	100.39	
A1. I	1.031	.178	.014	.019	.015	.021	.111	.071			.009	—				
26	61.62	18.11	2.36	1.28	0.56	1.44	5.77	7.60	0.78		0.87	0.13		CO ₂ none Cl 0.15	100.67	
A2. II	1.027	.177	.015	.018	.014	.026	.063	.081			.011	.001				
27	60.33	18.27	2.84	1.29	0.33	1.15	7.15	7.30	0.56		0.43	0.04		CO ₂ none Cl 0.43	100.17	
A2. II	1.006	.179	.018	.018	.010	.021	.115	.078			.005	—				
28	59.79	19.05	2.95	1.08	0.36	1.19	6.79	7.10	0.24		0.56	0.10		CO ₂ none Cl 0.53	99.74	
A2. II	.997	.187	.019	.015	.009	.021	.110	.076			.007	.001				
29	65.94	16.11	2.56	0.82	0.60	1.06	5.27	6.49	0.25	0.36	1.21		0.06		100.73	
A2. II	1.099	.158	.016	.011	.015	.019	.085	.069			.015		—			
30	60.43	18.35	1.64	0.91	0.17	1.41	6.15	8.68	0.62	0.34	0.36	trace	0.16	CO ₂ none ZrO ₂ 0.21 SO ₃ 0.22 Cl none BaO 0.08 SrO 0.02	99.75	
A1. I	1.007	.180	.010	.013	.004	.025	.099	.093			.005	—	.002			
31	63.28	17.48	2.89	1.41	0.66	0.52	5.86	6.18	0.35	0.30	0.95	0.25			100.15	
A2. II	1.055	.171	.013	.019	.017	.009	.095	.066			.012	.002				
32	61.92	18.20	0.27	2.90	1.01	1.65	5.55	6.17	1.44		0.38				99.49	
A3. III	1.032	.178	.002	.040	.025	.030	.090	.066			.005					
33	57.39	20.01	2.19	4.29	0.59	1.53	5.26	5.62	1.83	0.17	0.70	0.23			99.78	
A2. II	.957	.196	.014	.060	.015	.027	.085	.060			.009	.002				
34	58.89	17.61	2.44	3.47	0.65	2.11	4.57	7.86	1.80		0.58	0.11		SO ₃ trace	100.09	2.640
A2. II	.982	.173	.015	.049	.016	.038	.074	.084			.007	.001				
35	63.06	16.23	5.63	0.65	0.29	0.49	6.80	5.60	0.85				0.61		100.21	
A3. III	1.051	.159	.035	.009	.007	.009	.110	.060					.009			
36	61.45	19.64	2.19	0.22	1.00	0.60	4.10	7.58	2.37		0.40				99.55	
A3. III	1.024	.193	.014	.003	.025	.011	.066	.081			.005					

ORDER 5. PERFELIC. CANADARE—Continued.

SUBBRANG 3. SODIPOTASSIC. PHLEGROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
22	I''.(4)5.1''3.	Q 9.36 hy 1.40 or 43.92 mt 0.23 ab 34.06 hm 4.64 an 2.78 ap 0.34 C 1.12	Blitzengrund, Sudetische Mulde, Bohemia.	Böhm.	G. Berg, Jb. Pr. G. L.-A., XXVIII, p. 239, (1907), 1910.	Felsite.	
23	I(II).5.1''3.	or 52.82 di 4.35 ab 33.54 wo 2.44 an 2.50 mt 1.86 ne 1.14 il 0.76	Viezzena Thal, Monte Mulatto, Predazzo, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak. Wiss., 1904, p. 94.	Syenite.	
24	I''5''1.3.	or 53.93 di 0.65 ab 26.78 wo 2.44 an 2.78 mt 2.32 ne 6.96 il 1.06 hl 0.12 hm 1.76 th 0.28 ap 0.34	Via Aurelia, Vico Volcano, n. Viterbo.	H. S. Washing- ton.	H. S. Washington, J. G., IV, p. 849, 1896.	Phonolitic trachyte.	Also in R. C. R., p. 23, 1906. Block in tuff. In W. T., p. 195.
25	I''5.1.3(4).	or 39.48 di 3.24 ab 46.63 wo 0.46 ne 5.11 mt 2.32 hl 0.47 il 1.37 hm 0.64 ap 0.17	Marecocco, Ischia, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 20, 1906.	Trachyte.	Incomplete in A. J. S., VIII, p. 289, 1899. In W. T., p. 195.
26	I''5.1.3.	or 45.04 di 3.03 ab 41.39 wo 0.46 an 1.39 mt 1.62 ne 3.40 il 1.67 hl 0.23 hm 1.28 ap 0.34	Monte Rotaro, Ischia, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 28, 1906.	Trachyte obsidian.	Incomplete in A. J. S., VIII, p. 289, 1899. In W. T., p. 195.
27	I(II).5(6).1.3''.	or 43.37 ac 3.70 ab 35.37 di 2.91 ne 9.51 wo 0.93 hl 0.70 mt 2.32 il 0.76	Monte Nuovo, Phlegrean Fields, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 23, 1906.	Phonolitic trachyte.	Incomplete in A. J. S., VIII, p. 287, 1899. In W. T., p. 195.
28	I''5(6).1.3''.	or 42.26 di 1.94 ab 39.30 wo 0.46 an 2.22 mt 1.86 ne 7.95 il 1.06 hl 0.82 hm 1.76	Monte di Cuma, Phlegrean Fields, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 23, 1906.	Phonolitic trachyte.	Incomplete in A. J. S., VIII, p. 287, 1899. In W. T., p. 195.
29	I''5.1.3.	Q 8.22 di 2.38 or 38.36 hy 0.40 ab 44.54 il 1.67 an 1.11 hm 2.56 tn 0.78	Conca Cannas, Monte Arci, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVI, p. 584, 1913.	Trachyte.	
30	I(II).5(6).1.3.	or 51.71 ac 4.62 ab 25.04 ns 0.24 ne 10.65 di 3.35 wo 1.28 il 0.68	Monte Tinzosu, Monte Ferru, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXIX, p. 520, 1915.	Phonolite.	
31	I''5.1.3''.	Q 4.08 hy 1.70 or 36.70 mt 1.62 ab 49.78 il 1.82 an 0.56 hm 1.76 C 0.82 ap 0.67	Mont Antsutroto, Madagascar.	Boiteau.	A. Lacroix, pers. com., 1913.	Aegirite micro- syenite.	
32	I''5.I(2).3''.	or 36.70 di 1.89 ab 47.16 hy 2.58 an 6.12 ol 2.47 mt 0.46 il 0.76	Lokobé, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 101, 1902.	Pulaskite.	
33	I(II).5.1(2).3''.	or 33.36 hy 5.16 ab 44.54 ol 0.92 an 5.56 mt 3.25 C 3.16 il 1.37 ap 0.67	Mont Bezavona, Madagascar.	Boiteau.	A. Lacroix, pers. com., 1913.	Larvikite.	
34	I(II).5.1''3.	or 46.70 di 4.74 ab 32.49 ol 2.06 an 4.17 mt 3.48 ne 3.41 il 1.06 ap 0.34	Karissimbi, Kivu Lake Dis- trict, German East Africa.	Eyme.	L. Finckh, Wiss. Erg. D. Zentaf. Exp., I (1), p. 4, 1912.	Trachyte.	
35	I(II).5.1.3(4).	Q 2.22 ac 5.08 or 33.36 di 1.51 ab 51.87 wo 0.23 mt 4.18 hm 0.96	Kya River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 300, 1910.	Sölvbergite.	
36	I''5.1''3.	Q 5.70 hy 2.50 or 45.04 il 0.46 ab 34.58 hm 2.19 an 3.06 ru 0.16 C 3.57	Barabatuwa, n. Maros, Celebes.	Hinden.	C. Schmidt in Sarasin, Ins. Celebes, IV, p. 16, 1901.	Trachyte.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
37	61.15	22.07	1.05	1.02	0.40	0.75	5.86	7.01	0.71		0.20				100.22	
A3. III	1.019	.217	.006	.014	.010	.014	.095	.074			.003					
38	63.37	16.47	4.45	1.21	0.51	1.27	5.88	5.57	0.76						99.49	2.67
A3. III	1.056	.161	.028	.017	.013	.023	.095	.060								
39	65.90	16.74	1.72	1.99	0.06	0.09	6.35	5.77	0.43	0.27	0.25	none	0.06	CO ₂ none ZrO ₂ 0.29 SO ₃ none Cl trace F 0.16 S none NiO 0.01 BaO none SrO none	100.09	
A1. I	1.098	.164	.011	.028	.002	.002	.103	.062			.003	—	—			
40	64.63	16.55	2.93	1.16	0.16	0.46	5.23	6.11	1.35	1.05	0.58	none	0.08	ZrO ₂ 0.07 SO ₃ none Cl trace NiO trace BaO none SrO none	100.36	
A1. I	1.077	.162	.018	.016	.004	.008	.084	.065			.007	—	.001			
41	64.31	15.05	3.39	2.33	0.14	1.54	4.77	6.59	0.39	0.79	1.25	none	0.09	CO ₂ none ZrO ₂ 0.09 SO ₃ none Cl 0.02 F 0.10 S none NiO 0.03 BaO none SrO none	100.88	
A1. I	1.072	.148	.021	.032	.004	.028	.077	.070			.016	—	.001		(100.98)	
42	63.94	16.77	1.80	1.98	1.61	0.92	5.34	4.97	1.79	0.41	0.15	0.27	0.07	CO ₂ 0.02 ZrO ₂ none SO ₃ none Cl none F none S none Cr ₂ O ₃ none NiO none BaO 0.09 SrO trace V ₂ O ₅ none CuO none	100.13	2.629
A1. I	1.066	.164	.011	.028	.040	.016	.086	.053			.002	.002	.001			
43	62.42	17.69	2.72	2.19	0.20	1.53	5.93	6.29	0.69	0.24	0.35	none	0.08	CO ₂ none ZrO ₂ 0.20 SO ₃ 0.05 S none NiO trace BaO none SrO none	100.58	
A1. I	1.040	.173	.017	.031	.005	.027	.095	.067			.004	—	.001			
44	59.54	18.00	3.30	1.62	0.18	2.08	5.97	5.91	1.86	0.28	0.36	0.12	0.03	CO ₂ 0.30 ZrO ₂ 0.02 SO ₃ 0.06 Cl 0.03 F 0.09 Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.06 SrO trace	99.81	2.630
A1. I	.992	.176	.021	.022	.005	.038	.097	.063			.005	.001	—			
45	64.58	17.52	2.56	0.96	0.22	0.39	6.41	6.23	0.30	0.11	0.13	trace	0.08	CO ₂ 0.08 ZrO ₂ 0.21 SO ₃ none Cl 0.08 S 0.08 Cr ₂ O ₃ none NiO 0.03 BaO none SrO trace Li ₂ O none	99.97	2.62
A1. I	1.076	.172	.016	.014	.006	.007	.103	.066			.002	—	.001			
46	57.00	18.56	4.58	2.76	0.41	1.05	6.34	6.13	2.96						99.79	
A3. III	.950	.182	.029	.039	.010	.019	.102	.065								
47	61.22	18.01	1.32	4.51	0.44	1.88	6.49	5.93	0.46		0.42		trace		100.68	2.210
A3. III	1.020	.177	.008	.063	.011	.034	.105	.063			.005		—			
48	60.20	17.86	1.10	2.02	0.32	3.60	6.36	5.94	2.46						99.86	
A3. III	1.003	.175	.007	.028	.008	.064	.103	.063								

ORDER 5. PERFELIC. CANADARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. PHLEGROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
37	I.5.1''3''.	or 41.14 ol 1.21 ab 45.59 mt 1.39 an 3.89 il 0.46 ne 2.27 C 3.47	Maros, Celebes.	Hinden.	C. Schmidt in Sarasin, Ins. Celebes, IV, p. 19, 1901.	Bostonite.	
38	I''5.1.3(4).	Q 5.04 di 2.81 or 33.36 wo 0.46 ab 49.78 mt 3.94 an 1.67 hm 1.76	Carapook, Victoria.	J. Dennant.	J. Dennant, Pr. R. Soc. Vict., XIX (1), p. 13, 1901.	Trachyte.	
39	I.5.1.3(4).	Q 5.34 ac 0.46 or 34.47 di 0.49 ab 53.45 hy 1.92 Z 0.37 mt 2.32 il 0.46	Timur Rock, Warrumbungle Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 616, 1907.	Arfvedsonite trachyte.	
40	I.(4)5.1.3.	Q 9.78 hy 0.40 or 36.14 mt 2.32 ab 44.01 il 1.03 an 2.22 hm 1.28 C 0.51	Mount Ningadhun, Nandewar Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 903, 1907.	Trachyte.	
41	I(II)''5.1.3.	Q 9.54 di 0.86 or 38.92 wo 2.67 ab 40.35 mt 3.94 an 0.28 il 2.43 hm 0.64	Deriah Mountain, Nandewar Moun- tains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 903 (1907), 1908.	Trachyte.	
42	I(II).(4)5.1.3(4).	Q 9.48 hy 6.11 or 29.47 mt 2.55 ab 45.06 il 0.30 an 2.50 ap 0.67 C 1.63	Murrumbidgee River, n. Yass, New South Wales.	H. P. White.	L. F. Harper, Rec. G. S. N. S. W., IX, (1), p. 31, 1909.	Feldspar porphyry.	
43	I''5.1''3''.	Q 0.84 di 3.81 or 37.25 mt 3.94 ab 49.78 il 0.61 an 3.06	Mount Berum Buckle, Warrum- bungle Moun- tains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 616, 1907.	Pseudoleucite phonolite.	
44	I''5.1''3(4).	or 35.03 di 1.08 ab 47.68 wo 1.63 an 4.45 mt 3.94 ne 1.70 il 0.76 hm 0.64 ap 0.34	Bushrangers Hill, Dubbo, New South Wales.	Not stated.	A. R. Dep. Min. N. S. W., (1907), p. 185, 1908.	Soda syenite.	
45	I.5.1.3(4).	Q 2.64 di 0.86 or 36.70 hy 0.20 ab 53.97 mt 3.02 an 0.83 il 0.30 hm 0.45	Mount Beerwah, Glass House Mountains, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 168, 1906.	Trachyte.	
46	I(II).5''1''3(4).	or 36.14 di 0.92 ab 41.92 ol 1.38 an 4.17 mt 6.73 ne 6.25	Logans Point, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 402, 1906.	Trachytoid phonolite.	
47	I(II).5''1.3(4).	or 35.03 di 6.07 ab 45.32 ol 3.45 an 2.50 mt 1.80 ne 5.25 il 0.76	Goughs Island, South Atlantic.	L. V. Pirsson.	L. V. Pirsson, A. J. S., XLV, p. 382, 1893.	Trachyte obsidian.	In W. T., p. 195
48	I(II).5(6).1.3(4).	or 35.03 di 6.93 ab 41.39 wo 3.02 an 2.50 mt 1.62 ne 6.82	Mount Tapioi, Raiatea, Society Islands.	P. Marshall.	P. Marshall, Rep. Aust. A. A. S., XIII, p. 199, 1912.	Phonolite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	65.43	16.96	1.55	1.53	0.22	1.36	5.95	5.36	0.82		0.16	0.02	0.40	CO ₂ none SO ₃ 0.06 Cl 0.04 BaO none	99.86	
A1. I	1.091	.166	.010	.021	.006	.024	.096	.057			.002	—	.006			
2	59.96	19.12	1.85	1.73	0.65	2.24	6.98	4.91	1.10		0.66	0.14	0.49	CO ₂ none SO ₃ 0.06 Cl 0.14 BaO 0.12	100.17	
A1. I	.999	.183	.012	.024	.016	.040	.113	.052			.008	.001	.007			
3	61.77	18.05	1.77	1.75	0.89	1.54	6.83	5.21	1.10		0.74	0.15	0.08		99.88	
A2. II	1.030	.177	.011	.025	.022	.028	.110	.055			.009	.001	.001			
4	60.39	22.57	0.42	2.26	0.13	0.32	8.44	4.77	0.57				0.08	CO ₂ trace	99.95	
A3. III	1.007	.221	.003	.032	.003	.006	.136	.051					.001			
5	62.12	17.57	2.16	2.59	0.86	2.37	6.78	4.79	0.48	0.09	0.84	0.23			100.88	
A2. II	1.035	.172	.014	.036	.022	.043	.110	.051			.010	.002				
6	63.09	18.44	2.90	1.36	0.16	1.00	7.25	5.23	0.62	0.21	0.45		trace	ZrO ₂ 0.06	100.77	
A2. III	1.052	.180	.018	.019	.004	.018	.117	.056			.006		—			
7	60.60	18.28	2.85	2.67	0.52	0.99	6.66	5.73	0.69		0.71	0.15			99.85	
A2. II	1.010	.180	.018	.037	.013	.018	.107	.061			.009	.001				
8	59.31	22.50	1.93	1.40	0.17	0.46	7.98	4.08	1.12	0.15	0.32		trace		99.42	2.599
B3. IV	.989	.221	.012	.019	.004	.008	.129	.043			.008		—			
9	62.46	17.10	2.49	2.65	0.28	1.27	6.84	5.44	0.49	0.15	0.38	0.11	0.18	ZrO ₂ 0.10 S none BaO none SrO trace CeO ₂ 0.03	99.97	2.581
A3. III	1.041	.168	.016	.037	.007	.023	.110	.058			.010	.001	.003			
10	61.08	18.71	1.91	0.63	0.08	1.58	8.68	4.63	2.21		0.18		trace	SO ₃ trace Cl 0.12 BaO 0.05	99.86	2.582
A2. II	1.018	.183	.012	.009	.002	.029	.140	.049			.002		—			
11	64.33	17.52	3.06	0.94	0.34	0.56	7.30	4.28	0.95	0.04	trace	trace	0.35		99.67	
A3. III	1.072	.172	.019	.013	.009	.010	.118	.046			—	—	.005			
12	62.17	18.58	2.15	1.05	0.73	1.57	7.56	3.88	1.63	0.07	trace	0.11	trace		99.50	
A3. III	1.036	.182	.013	.015	.018	.028	.122	.041			—	.001	—			
13	63.24	17.98	2.67	0.85	0.63	0.93	6.27	5.47	0.80	0.37	0.38	0.22	0.04	CO ₂ none ZrO ₂ trace S trace Cr ₂ O ₃ none V ₂ O ₅ 0.01 NiO none BaO 0.25 SrO 0.03	100.14	
A1. I	1.054	.176	.017	.012	.016	.016	.101	.059			.005	.002	—			
14	65.08	16.65	2.01	1.08	0.21	1.49	7.31	5.14	0.30	0.32	0.20		0.13	CO ₂ none ZrO ₂ 0.03 S 0.02 Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.03 SrO 0.03	100.07	
A1. I	1.085	.163	.013	.015	.005	.027	.118	.054			.003		.002			

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 4. DOSODIC. NORDMARKOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I''5.1''(3)4.	Q 6.90 di 2.64 or 31.69 hy 1.22 ab 50.30 mt 2.32 an 3.61 il 0.30	Shefford Mountain, Quebec.	M. F. Connor.	J. A. Dresser, A. G., XXVIII, p. 209, 1901.	Nordmarkite.	Also in Can. G. S. A. R. XIII, p. 214, (1900), 1903.
2	I(II).5.1(2)''4.	or 28.91 di 4.36 ab 50.83 ol 0.65 an 5.00 mt 2.78 ne 4.54 il 1.22 ap 0.34	Shefford Mountain, Quebec.	M. F. Connor.	J. A. Dresser, A. G., XXVIII, p. 211, 1901.	Pulaskite.	
3	I''5.1''''4.	or 30.58 di 2.91 ab 55.28 ol 1.14 an 3.34 mt 2.55 ne 1.28 il 1.37 ap 0.34	Brome Mountain, Quebec.	M. F. Connor.	J. A. Dresser, A. J. S., XVII, p. 354, 1904.	Syenite.	Also in Can. G. S. A. R., XVI, p. 12 G., (1904), 1906.
4	I.5(6).1.4.	or 28.36 di 3.27 ab 52.40 ol 0.70 an 1.67 ne 10.22 C 2.96	Litchfield, Maine.	L. G. Eakins.	W. S. Bayley, B. G. Soc. Am., III, p. 241, 1892.	Litchfieldite.	In W. T., p. 195.
5	I(II).5.1(2)''4.	or 28.36 di 5.47 ab 56.59 ol 0.72 an 3.34 mt 3.25 ne 0.57 il 1.52 ap 0.67	Tripyramid Mountain, Waterville, New Hampshire.	C. J. Monahan.	L. V. Pirsson, A. J. S., XXXI, p. 408, 1911.	Umptekite.	
6	I''5.1''4.	or 31.14 di 0.86 ab 59.21 wo 0.81 an 1.95 mt 3.02 ne 1.14 il 0.91 hm 0.80	Salem Neck, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VI, p. 806, 1898.	Pulaskite.	In W. T., p. 195.
7	I''5.1''(3)4.	or 23.92 di 0.68 ab 51.09 ol 1.69 an 3.34 mt 4.18 ne 2.70 il 1.37 ap 0.34	Coney Island, Salem Harbor, Essex County, Massachusetts.	M. Dittrich.	H. Rosenbusch, Elem. Gest., 1898, p. 199.	Syenite porphyry (sölvberg- ite).	Cf. No. 6, I.5.1.3. In W. T., p. 195.
8	I.5.1.4.⊙	or 23.91 ol 0.59 ab 59.21 mt 2.78 an 2.22 il 0.61 ne 4.54 C 4.18	Great Haste Island, Salem Harbor, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VI, p. 803, 1898.	Foyaite.	In W. T., p. 197.
9	I''5.1''4.	or 32.25 di 4.74 ab 56.59 mt 3.71 ne 0.57 il 1.52 ap 0.34	Santiago Mountain, Trans-Pecos, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 228, p. 75, 1904.	Pulaskite.	
10	I''5(6).1.4.	or 27.24 ac 2.77 ab 52.40 di 0.68 ne 9.66 wo 3.02 mt 1.39 il 0.30	Devils Tower, Black Hills, South Dakota.	L. V. Pirsson.	L. V. Pirsson, A. J. S., XLVII, p. 344, 1894.	Phonolite.	In W. T., p. 197.
11	I.5.1.4.⊙	Q 3.66 di 0.43 or 25.58 hy 0.70 ab 61.83 mt 3.94 an 2.28 hm 0.32	Sixteen-mile Creek, Crazy Mountains, Montana.	W. H. Melville.	Wolff and Tarr, B. Mus. Comp. Zool., XVI, p. 232, 1893.	Acmite trachyte (sölvberg- ite).	In W. T., p. 197.
12	I.5.1(2).4.	or 22.80 di 1.30 ab 63.93 hy 0.20 an 5.28 ol 0.90 mt 3.02 ap 0.34	North part of Crazy Mountains, Montana.	W. H. Melville.	Wolff and Tarr, B. Mus. Comp. Zool., XVI, p. 232, 1893.	Acmite trachyte (sölvberg- ite).	In W. T., p. 197.
13	I.5.1''(3)4.	Q 3.12 hy 1.60 or 32.80 mt 1.62 ab 52.92 il 0.76 an 3.61 hm 1.60 C 0.31 ap 0.67	Dike Mountain, Yellowstone National Park.	W. F. Hille- brand.	Hague and Jaggard, U. S. G. S. B. 168, p. 98, 1900.	Biotite tra- chyte.	In W. T., p. 197.
14	I(II).5.1''4.	Q 1.86 ac 4.16 or 30.02 di 3.07 ab 57.11 wo 1.63 mt 0.93 il 0.46	Beaver Creek, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Soda syenite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
15	62.79	19.10	2.29	0.36	0.40	0.87	6.23	5.58	0.84	0.25	0.71	0.12	0.07	CO ₂ trace ZrO ₂ 0.02 SO ₃ none Cl FeS ₂ 0.10 BaO 0.14 SrO 0.03	99.90	
A1. I	1.047	.187	.014	.005	.010	.016	.100	.060			.009	.001	.001			
16	62.64	17.36	2.79	0.63	0.53	1.70	7.00	4.97	0.53	0.43	0.43	0.12	0.04	CO ₂ 0.54 ZrO ₂ 0.02 SO ₃ 0.06 Cl 0.03 S none BaO 0.10 SrO 0.07 Li ₂ O none	99.99	
A1. I	1.044	.170	.018	.009	.013	.030	.113	.053			.005	.001	—			
17	65.51	16.89	1.41	2.52	0.39	1.19	6.42	5.02	0.16		0.92	0.07	0.31		100.81	
A2. II	1.092	.165	.009	.035	.010	.021	.103	.054			.011	—	.004			
18	66.50	16.24	1.43	3.39	0.08	0.86	6.06	4.36	0.42		0.30	0.03	0.10	ZrO ₂ 0.11 BaO 0.02	99.90	
A1. I	1.108	.159	.009	.047	.002	.015	.098	.047			.004	—	.001			
19	66.70	16.60	2.33	0.87	1.08	1.48	5.80	4.60	n. d.		0.40	0.06			99.92	
A2. II	1.112	.163	.008	.013	.027	.027	.094	.049			.005	—				
20	66.17	16.09	2.88	none	0.32	1.69	6.58	4.83	0.14		0.94	0.16	0.34	SO ₃ none BaO 0.09	100.23	
A2. II	1.103	.158	.018	—	.008	.030	.106	.051			.012	.001	.005			
21	65.55	16.81	2.26	1.11	0.41	2.07	6.58	4.18	n. d.		0.68	0.07			99.72	
A2. II	1.093	.165	.014	.015	.010	.038	.106	.044			.009	—				
22	65.88	16.03	2.56	1.84	0.29	0.25	7.44	4.66	0.34		trace	0.02		ZrO ₂ 0.45	99.76	
A2. II	1.098	.157	.016	.025	.007	.005	.120	.050			—	—				
23	66.50	16.25	2.04	0.19	0.18	0.85	7.52	5.53	0.50		0.70	trace	0.20		100.46	
A2. II	1.108	.159	.013	.003	.005	.015	.121	.059			.009	—	.003			
24	64.92	16.30	3.62	0.84	0.22	1.20	6.62	4.98	0.50				0.40		99.60	
A3. III	1.082	.160	.023	.012	.006	.021	.106	.053					.006			
25	57.52	18.46	2.23	2.44	1.08	2.12	7.58	4.08	1.80		0.92	0.21			99.64	
A2. II	.959	.181	.014	.034	.027	.038	.122	.043			.012	.001				
26	67.79	15.29	1.05	0.59	1.70	3.03	6.89	2.79	0.23		0.63	0.02	0.06	S 0.01 BaO 0.06	100.14	
A1. I	1.130	.150	.007	.008	.043	.054	.111	.030			.008	—	—			
27	64.74	19.94	0.61	1.10	0.18	0.94	8.20	4.02	0.33		0.06	0.11	0.04	CO ₂ 0.15 S 0.09	100.51	
A2. II	1.079	.196	.004	.015	.005	.017	.132	.042			.001	.001	—			
28	63.76	17.37	0.10	1.11	0.93	1.72	6.69	5.97	0.40		0.70	0.16	0.37	CO ₂ none	99.28	
B2. IV	1.063	.170	.001	.015	.023	.030	.108	.064			.009	.001	.005			
29	66.06	16.46	2.25	1.10	0.19	0.79	6.81	5.52	0.62				0.55		100.35	
A3. III	1.101	.161	.014	.015	.005	.014	.109	.059					.008			

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 4. DOSODIC. NORDMARKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
15	I.5.1''.(3)4.	Q 3.06 hy 1.00 or 33.36 il 0.91 ab 52.40 hm 2.29 an 3.61 tn 0.24 C 1.43 ap 0.34	Portland Mine, Cripple Creek, Colorado.	W. F. Hille- brand.	Lindgren and Ran- some, U. S. G. S. P. P. 54, p. 79, 1906.	Biotite tra- chyte.	
16	I''5.1''4.	Q 0.24 di 2.81 or 29.47 wo 1.16 ab 59.21 mt 0.93 an 1.11 il 0.76 hm 2.24 ap 0.34	Near Mount Waas, LaSal Mountains, Utah.	W. F. Hille- brand.	L. M. Prindle, U. S. G. S. B. 228, p. 191, 1904.	Pulaskite.	
17	I''5.1''4.	Q 5.52 di 3.10 or 53.02 hy 1.92 ab 53.97 mt 2.09 an 2.22 il 1.67	San Mateo Mountain, Mount Taylor Region, New Mexico.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 185, 1897.	Andesite.	In W. T., p. 197.
18	I.(4)5.1''4.	Q 10.38 hy 4.82 or 26.13 mt 2.09 ab 51.35 il 0.61 an 3.89	Cerro Balmaceda, Patagonia, Chile.	R. Mauzelius.	P. D. Quensel, B. G. Inst. Un. Ups., XI, p. 41, 1911.	Nordmarkite.	
19	I.(4)5.1(2).(3)4.	Q 10.80 di 1.51 or 27.24 hy 2.00 ab 49.25 mt 1.86 an 5.56 il 0.76	Puy de Dome, Auvergne.	Pisani.	A. Lacroix, C. R., CXLVII, p. 830, 1908.	Biotite domite.	
20	I''5.1''4.	Q 7.92 di 1.73 or 28.36 wo 1.28 ab 55.54 il 0.76 an 0.28 hm 2.88 tn 1.37 ap 0.34	Puy de Dome, Auvergne.	P. Holland.	Dickson and Holland, Pr. Liverp. G. Soc., VIII, p. 412, 1899.	Domite.	
21	I''5.1''4.	Q 7.80 di 2.16 or 24.46 wo 1.51 ab 55.54 mt 1.39 an 4.17 il 1.37 hm 1.28	Puy de Dome, Auvergne.	Pisani.	A. Lacroix, C. R., CXLVII, p. 830, 1908.	Hornblende domite.	
22	I(II).5.1''4.	Q 3.96 ac 6.01 or 27.80 di 1.21 ab 56.07 hy 2.98 Z 0.73 mt 0.70	Cevadaes, Alemtejo, Portugal.	M. Dittrich.	H. Rosenbusch, Elem. Gest., 1898, p. 484.	Arfvedsonite gneiss.	Not in W. T.
23	I''5.1.(3)4.	Q 4.86 ac 6.01 or 32.80 ns 0.98 ab 52.40 di 1.08 wo 0.81 il 0.91 tn 0.59	Kvelle Kerke, Lougendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 216, 1898.	Lestiwarite.	In W. T., p. 197.
24	I''5.1''4.	Q 6.00 di 1.30 or 29.47 wo 1.63 ab 55.54 mt 4.18 an 0.28 hm 0.80	Sölvserget, Gran, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 78, 1894.	Sölvsergetite.	In W. T., p. 197.
25	I(II).5''1''4.	or 23.91 di 4.23 ab 49.78 ol 1.25 an 4.45 mt 3.25 ne 7.67 il 1.82 ap 0.34	Skirstad Lake, Gran, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 181, 1894.	Hedrumite (foyaite).	In W. T., p. 253.
26	I(II).(4)5.1.4.	Q 10.68 di 9.29 or 16.68 wo 0.23 ab 58.16 mt 0.23 an 2.50 il 1.22 hm 0.96	Kirunavaara, Lapland, Sweden.	R. Mauzelius.	P. Geijer, G. Kir. Dist., p. 49, 1910.	Syenite porphyry.	
27	I.5.1''4.	or 23.35 ol 1.37 ab 69.17 mt 0.93 an 3.89 il 0.15 C 0.82 ap 0.34	Broängen, Almunge, Sweden.	N. Sahlbom.	P. D. Quensel, B. G. Inst. Un. Ups., XII, p. 159, (1913), 1914.	Aplitic umpteckite.	Marginal zone of No. 8, II.5.1.3.
28	I''5.1.(3)4.	or 35.58 ac 0.46 ab 52.40 ns 0.12 ne 2.27 di 3.12 ol 0.66 il 1.22 ap 0.34	Ahvenvaara, Kuusamo, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., No. 11, p. 35, 1900.	Pyroxene syenite.	In W. T., p. 197.
29	I''5.1.(3)4.	Q 4.32 ac 3.22 or 22.80 di 3.12 ab 53.45 hy 0.86 mt 1.62	Hohenburg, n. Berkum, Bonn, Rheinland.	S. Laspeyres.	S. Laspeyres, Vh. Nh. Ver. Rhld., X, p. 394, 1883.	Liparite (trachyte).	Not in W. T. In W. R. T., p. 25.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
30	63.61	16.34	4.30	2.08	0.37	1.42	6.21	5.54	0.77				trace	Cl 0.18	100.82	
A3. III	1.060	.160	.027	.030	.009	.025	.100	.059					—			
31	62.15	20.97	1.68	1.01	0.41	1.56	7.88	3.02	1.02		0.14	0.58			100.42	
A2. II	1.036	.206	.011	.014	.010	.028	.127	.032			.002	.004				
32	62.04	17.44	4.22	0.36	1.88	0.57	6.31	4.20	1.63		0.71	0.37		SO ₃ 0.12	99.85	2.620
A2. II	1.034	.171	.026	.005	.047	.010	.102	.045			.009	.003				
33	58.41	21.09	1.52	0.92	0.21	1.32	7.07	5.83	2.82		trace	0.24	trace	CO ₂ trace	99.43	
B3. IV	.974	.207	.009	.013	.005	.023	.115	.062			—	.002	—			
34	57.94	20.83	1.60	1.38	0.31	1.72	6.92	5.94	2.28		0.21	0.48	0.21	CO ₂ SO ₃ trace 0.20	100.02	
A2. II	9.66	.204	.010	.019	.008	.030	.111	.063			.003	.003	.003			
35	63.43	16.31	2.04	3.14	0.78	1.70	6.71	4.31	0.18	0.26	1.19	0.20	0.04	CO ₂ ZrO ₂ SO ₃ BaO none 0.06 0.05 0.05	100.45	
A1. I	1.057	.160	.013	.043	.020	.030	.108	.046			.015	.001	—			
36	63.30	16.38	2.54	2.36	0.84	1.62	6.36	4.41	0.83	0.10	0.71	0.30			99.75	
A2. II	1.055	.161	.016	.033	.021	.029	.103	.047			.009	.002				
37	63.44	17.85	2.82	1.79	0.37	0.69	7.36	5.48	0.76						99.56	
A3. III	1.057	.175	.018	.025	.009	.013	.119	.059								
38	64.95	17.80	2.69	1.22	1.09	1.08	5.65	4.90			0.83	0.22			100.43	
A2. II.	1.083	.174	.017	.017	.027	.019	.091	.052			.010	.002				
39	59.20	20.40	2.03	1.09	1.40	0.82	8.22	5.02	2.06		0.25	trace		Cl 0.20	100.69	
A2. II	.987	.200	.013	.015	.035	.014	.132	.053			.003	—				
40	61.81	19.20	0.73	1.64	0.52	0.20	7.90	6.75	1.00		0.06	trace	0.05	Cl 0.54	100.40	
A2. II	1.030	.188	.004	.023	.013	.004	.127	.072			.001	—	—			
41	67.4	16.2	0.8	1.8	1.1	2.4	6.6	3.2	0.6		0.6				100.7	
B3. IV	1.123	.157	.005	.025	.028	.043	.106	.034			.008					
42	63.74	17.86	4.27	0.30	0.10	0.83	7.23	5.19	0.83		trace		0.19		100.54	
A3. III	1.062	.175	.027	.004	.003	.015	.117	.056			—		.003			
43	67.0	17.7	1.9	2.0	0.2	0.8	6.5	4.3	0.5						100.9	2.60
B3. IV	1.117	.174	.012	.028	.005	.014	.105	.046								
44	65.54	19.84	1.78	0.16	trace	0.25	6.01	5.25	0.71	0.16	0.23	0.11			100.04	
A2. II	1.092	.195	.011	.002	—	.004	.097	.056			.003	.001				

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 4. DOSODIC. NORDMARKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
30	I(II).5.1.(3)4.	Q 4.98 di 2.69 or 32.80 wo 1.04 ab 50.83 mt 6.26 an 1.11 hl 0.35	Kühlsbrunnen, Siebengebirge.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn, LIII, p. 44, 1896.	Aegirite trachyte.	In W. T., p. 197.
31	I.5.1.4.○	Q 2.44 hy 1.13 or 17.77 mt 2.35 ab 66.55 il 0.30 an 4.17 ap 1.34 C 3.26	Haarweiden, Westerswald, Hesse Nassau.	H. Schneider- höhn.	H. Schneiderhöhn, Jb. Pr. G. L.-A., XXX, (II), p. 306, (1909), 1910.	Trachyte.	
32	I(II).5.1.4.	Q 6.30 hy 4.70 or 25.02 il 0.76 ab 53.45 hm 4.22 C 2.45 ru 0.32 ap 1.01	Near Rothemühle, Thüringerwald, Germany.	Hampe.	H. Loretz, Jb. Pr. G. L.-A., (1888), p. 300, 1889.	Biotite porphyrite.	In W. T., p. 197.
33	I.5(6).1''.(3)4.	or 24.47 ol 0.76 ab 44.01 mt 2.09 an 4.45 ap 0.67 ne 8.80 C 1.43	Münzberg, Polzengebiet, N. Bohemia.	K. H. Scheu- mann.	K. H. Scheumann, Abh. Säch. Ges. W., XXXII, p. 756, 1913.	Trachytoid phonolite.	
34	I.5(6).1(2).(3)4.	or 35.03 ol 1.48 ab 41.39 mt 2.32 an 5.56 il 0.46 ne 9.09 ap 1.01 C 2.04	Münzberg, Polzengebiet, N. Bohemia.	K. H. Scheu- mann.	K. H. Scheumann, Abh. Säch. Ges. W., XXXII, p. 756, 1913.	Trachytoid phonolite.	
35	I(II).5.1.4.	Q 3.90 di 4.83 or 25.58 hy 1.59 ab 56.59 mt 3.02 an 1.67 il 2.23 ap 0.34	Montagna Grande, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 688, 1913.	Trachyte.	
36	I(II).5.1''.'4.	Q 5.58 di 2.48 or 26.13 hy 1.96 ab 53.97 mt 3.71 an 3.06 il 1.37 ap 0.67	Monte Gibele, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 688, 1913.	Trachyte.	
37	I''5.1.'4.	or 32.80 ac 1.39 ab 56.33 di 3.03 ne 2.41 ol 0.52 mt 3.48	Lagoa Sete Cidades, Sao Miguel, Azores.	R. Reinisch.	R. Reinisch, Deutsch. Sud. Pol. Exp., II, (7), p. 659, 1912.	Katoforite trachyte.	
38	I''.(4)5.1''.(3)4.	Q 10.44 hy 2.70 or 28.91 mt 1.62 ab 47.68 il 1.52 an 3.34 hm 1.69 C 1.94 ap 0.67	Gebel Siroua Volcano, Morocco.	Pisani.	L. Gentil, C. R. CXLVI, p. 186, 1908.	Biotite trachyte.	
39	I.5(6).1''4.	or 29.47 ol 2.45 ab 47.68 mt 2.78 an 3.88 il 0.46 ne 10.79 hm 0.16 hl 0.85 C 0.41	Ain Anou Daous- derm, Gebel Siroua, Morocco.	Pisani.	L. Gentil, C. R., CXLVI, p. 187, 1908.	Phonolite.	
40	I.5''1.(3)4.	or 40.03 ac 1.39 ab 44.54 di 0.92 ne 8.80 ol 2.71 hl 0.94 mt 0.23 il 0.15	Rouma, Los Islands, French Guinea.	Pisani.	A. Lacroix, Nouv. Arch. Mus., III, p. 38, 1911.	Syenite pegmatite.	Also in B. Soc. Fr. Min., XXXV, p. 20, 1912.
41	I(II).(4)5.1(2).4.	Q 10.98 di 5.88 or 18.90 hy 1.53 ab 55.54 mt 1.16 an 4.73 il 1.22	Gebel Doukhan, Red Sea, Egypt.	Not stated.	C. Couyat, C. R., CXL, CXLVII, p. 868, 1908.	Microgranite.	
42	I''5.1.'4.	Q 0.24 di 0.65 or 31.14 hy 1.16 ab 61.31 mt 1.62 an 0.56 hm 3.20	Edda Gijorgis, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 266, 1900.	Sölvbergite.	In W. T., p. 197.
43	I.(4)5.1''4.	Q 9.72 hy 2.61 or 25.58 mt 2.78 ab 55.02 an 3.89 C 0.92	Arto, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est Afr., p. 75, 1906.	Aegirite microsyne- nite.	
44	I.(4)5.1.(3)4.	Q 10.32 # 0.30 or 31.14 hm 1.78 ab 50.83 ru 0.08 an 0.28 ap 0.34 C 4.18	Betankilanton (?), Madagascar.	Boiteau.	A. Lacroix, pers. com., 1913.	Micronord- markite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
45	63.20	19.29	1.48	0.38	0.13	0.86	7.48	5.22	1.15	0.37	0.23	0.07		Cl 0.02	99.88	
A2. II	1.053	.189	.009	.006	.003	.015	.121	.055			.003	—				
46	62.91	18.25	2.08	1.47	0.20	0.87	6.87	5.85	0.47		0.94	0.19			100.10	
A2. II	1.049	.179	.013	.021	.005	.016	.111	.063			.012	.001				
47	60.95	19.50	1.85	1.19	0.15	1.88	7.17	5.20	1.07	0.16	0.42	0.08		SO ₃ 0.03 Cl 0.15	99.80	
A2. II	1.016	.191	.012	.017	.004	.034	.116	.055			.005	—				
48	60.90	18.42	2.02	2.93	0.40	0.97	6.38	5.56	0.80	0.65	0.47	0.13			99.63	
A2. II	1.015	.180	.013	.040	.010	.017	.103	.060			.006	.001				
49	60.81	18.73	2.60	2.37	0.42	1.52	7.76	4.69	0.31	0.16	0.15	0.11			99.63	
A2. II	1.014	.184	.016	.033	.011	.027	.126	.050			.002	.001				
50	60.30	20.62	1.53	0.51	0.19	1.49	8.06	5.64	0.31	0.12	0.25	0.08	0.20	SO ₃ 0.18 Cl 0.31	99.79	
A2. II	1.005	.202	.009	.007	.005	.027	.130	.060			.003	—	.003			
51	61.49	18.25	1.77	3.13	0.41	1.65	6.78	5.47	0.26		0.51	0.09			99.81	
A2. II	1.025	.179	.011	.043	.010	.030	.110	.059			.006	.001				
52	66.71	15.82	0.71	0.32	2.05	3.92	7.12	2.42	1.01						100.08	
A3. III	1.112	.155	.004	.004	.051	.070	.114	.025								
53	65.46	17.49	3.00	1.60	0.09	0.76	6.51	4.74	0.35	0.52	0.24	none	trace	SO ₃ none Cl trace	100.67	2.59
A2. II	1.091	.171	.019	.022	.002	.014	.105	.050			.003	—	—			
54	63.82	17.85	2.75	1.67	0.06	0.59	7.13	5.51	0.20	0.66	0.25	none	0.04	CO ₂ none Cl trace NiO none BaO none SrO none	100.53	
A1. I	1.064	.175	.017	.024	.002	.011	.115	.059			.003	—	—			
55	60.32	18.32	3.55	1.96	0.01	1.12	7.01	6.25	1.31	0.35	0.25	none	0.03	CO ₂ trace ZrO ₂ 0.33 SO ₃ 0.11 Cl none NiO 0.05 BaO none	101.02	
B1. II	1.005	.180	.022	.027	—	.020	.113	.067			.003	—	—			
56	66.04	18.38	1.05	n. d.	0.69	0.96	7.22	5.09	1.50						100.93	
B3. IV	1.101	.180	.007	(.014)	.017	.017	.116	.054								
57	61.69	17.33	5.30	0.07	0.16	1.05	7.47	3.47	1.93	0.42	0.67	0.05	0.21	CO ₂ none ZrO ₂ 0.16 S 0.02 BaO 0.07 SrO 0.03	100.10	
A1. I	1.028	.170	.033	.001	.004	.019	.120	.037			.008	—	.001			
58	61.07	17.77	2.18	1.49	0.88	1.30	6.80	5.58	1.71	0.11	0.94	none	0.05	CO ₂ none ZrO ₂ 0.12 SO ₃ none BaO none	100.00	
A1. I	1.018	.174	.014	.021	.022	.023	.110	.060			.012	—	—			
59	60.50	18.20	1.34	1.89	1.18	1.75	7.25	4.45	2.30		0.92				99.78	
A3. III	1.008	.178	.008	.026	.030	.031	.117	.048			.012					
60	67.05	15.43	3.25	1.25	0.16	1.06	6.12	5.32	0.56		0.10	0.04			100.34	
A2. II	1.118	.151	.020	.018	.004	.019	.098	.056			.001	—				

ORDER 5. PERFELIC. CANADARE—Continued.

SUBBRANG 4. DOSODIC. NORDMARKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
45	I.5.1''4.	or 30.58 di 0.43 ab 59.21 ol 0.07 an 3.61 mt 0.70 ne 2.27 il 0.46 hm 0.96	Betankilastra, Madagascar.	Not stated.	A. Lacroix, pers. com., 1913.	Syenite.	
46	I''5.1.(3)4.	or 35.03 di 1.08 ab 55.80 wo 0.35 an 1.89 il 1.82 ne 1.28 hm 0.64 ap 0.34	Angorong, Madagascar.	Boiteau.	A. Lacroix, pers. com., 1913.	Aegirite trachyte.	
47	I.5.1(2)''4.	or 30.58 di 0.86 ab 51.87 wo 1.16 an 5.56 mt 2.78 ne 4.83 il 0.76	Iliazadramosa, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 176, 1913.	Phonolitic trachyte.	
48	I''5.1''(3)4.	or 33.36 ol 2.84 ab 52.92 mt 3.02 an 3.89 il 0.91 ne 0.57 ap 0.34 C 0.31	Androhilé, Madagascar.	Boiteau.	A. Lacroix, pers. com., 1913.	Sölvbergite.	
49	I''5''1.4.	or 27.80 di 3.75 ab 53.45 ol 0.89 an 2.22 mt 3.71 ne 6.82 il 0.30 ap 0.34	Tsifakafokely, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 176, 1913.	Phonolite.	
50	I.5(6).1''''4.	or 33.36 di 1.08 ab 45.59 wo 0.35 an 5.28 mt 1.62 ne 10.22 il 0.46 hl 0.47 hm 0.32 th 0.43	Kitia, Itasy, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 179, 1913.	Phonolite.	
51	I(II).5.1.(3)4.	or 32.80 di 4.05 ab 50.83 ol 1.78 an 2.78 mt 2.55 ne 3.69 il 0.91 ap 0.34	Ravin des Fleurs Jaunes, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 541, 1912.	Phonolitic trachyte.	
52	I(II)''5.1(2).4.	Q 8.46 di 11.02 or 13.90 wo 0.35 ab 59.74 mt 0.93 an 4.45	Deleng Baros, Sumatra.	W. Herz.	L. Milch, Z. D. G. G., LI, p. 66, 1899.	Dacite.	In W. T., p. 203.
53	I''5.1''''4.	Q 7.86 hy 0.20 or 27.80 mt 4.41 ab 55.02 il 0.46 an 3.89	Camel's Hump, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vc. B. 24, p. 20, 1912.	Sölvbergite.	
54	I.5.1''4.	Q 0.12 di 1.43 or 32.80 wo 0.46 ab 60.26 mt 3.94 an 0.28 il 0.46	Timor Rock, Warrumbungle Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 617, 1907.	Aegirite trachyte.	
55	I''5''1.(3)4.	or 37.25 di 0.49 ab 46.11 wo 2.09 ne 7.10 mt 5.10 Z 0.55 il 0.46	Mount Bingy Grumble, Warrumbungle Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 616, 1907.	Nosean phonolite.	
56	I.5.1''4.	Q 1.38 di 1.61 or 30.02 hy 2.75 ab 60.78 an 2.78	Portobello, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 399, 1906.	Trachyte.	
57	I''5.1''4.	Q 3.00 di 0.43 or 20.57 hy 0.20 ab 62.88 il 0.61 an 3.61 hm 5.30 tn 0.78	Lahaina, Maui Island, Hawaiian Islands.	G. Steiger.	W. Cross, U. S. G. S. P. P. 88, p. 27, 1915.	Trachyte.	
58	I(II).5.1.(3)4	or 33.36 di 4.10 ab 51.35 ol 0.07 an 1.11 mt 2.07 ne 3.41 il 1.82 hm 0.80	Taiarapu, Tahiti.	H. S. Washington.	J. P. Iddings, pers. com.	Trachyte.	
59	I''5.1''4.	or 26.69 di 3.99 ab 54.49 ol 1.35 an 3.61 mt 1.86 ne 3.69 il 1.82	Vairao, Tahiti.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 112, 1910.	Tinguaite.	
60	I''(4)5.1.(3)4.	Q 10.62 ac 1.39 or 31.14 di 0.86 ab 49.78 wo 1.74 mt 3.94 il 0.15	Green Mountain, Ascension Island.	R. Reinisch.	R. Reinisch, D. Sudpol. Exp., II, (7), p. 648, 1912.	Aenigmatite trachyte.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. NORDMARKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
61	66.12	15.51	3.27	0.93	0.17	1.05	6.31	5.40	1.98						100.65	
A3. III	1.102	.152	.020	.013	.004	.019	.102	.057								
62	63.98	16.00	2.57	2.12	0.64	1.58	6.45	5.18	0.61		0.28				99.41	
A3. III	1.066	.157	.016	.029	.016	.029	.104	.055			.004					
63	63.02	15.75	0.52	3.15	0.38	1.49	6.11	5.21	4.83						100.46	
A3. III	1.050	.155	.003	.044	.010	.027	.098	.055								

RANG 1. PERALKALIC. NORDMARKASE.

1	67.53	18.57	1.13	0.08	0.24	0.55	11.50	0.10	0.31	0.15	0.07	0.11	trace	SiO ₂ trace	100.34	
A2. II	1.126	.182	.007	.001	.006	.010	.185	.001			.001	.001	—			
2	63.32	17.30	2.03	1.82	0.94	2.42	8.73	1.38	0.24		1.72	trace	0.05	S 0.03	99.98	
A2. II	1.055	.170	.013	.025	.024	.043	.140	.015			.022	—	—			
3	67.07	18.85	0.91	n. d.	1.53	1.09	10.84	0.48	n. d.		0.23				101.00	
A4. IV	1.118	.185	.006	(.012)	.038	.020	.175	.005			.003					
4	62.53	18.72	3.26	0.34	0.08	0.54	11.77	0.79	0.68				0.16	ZrO ₂ 1.08	99.95	2.690
A2. II	1.042	.184	.020	.005	.002	.010	.190	.008					.002			
5	68.36	18.74	none	1.15	0.54	0.39	10.22	0.07	0.03	none			0.45		100.02	2.64
A3. III	1.139	.184	—	.016	.014	.007	.165	.001					.006			

RANG 2. DOMALKALIC. PULASKASE. (C. I. P. W., 1902.)

1	58.21	18.88	4.07	0.87	0.98	3.58	2.57	9.17	0.74		0.82	0.20		CO ₂ none	100.09	
A2. II	.970	.185	.028	.013	.025	.064	.042	.098			.010	.001				
2	57.95	19.33	3.03	1.12	1.12	3.93	3.10	8.55	0.54	0.11	0.82	0.20		CO ₂ none	99.80	
A2. II	.966	.189	.019	.015	.028	.070	.050	.091			.010	.001				
3	56.19	20.75	1.71	2.19	1.14	3.53	2.86	10.47	0.70	0.30	0.65	0.24		CO ₂ none	100.73	
A2. II	.936	.203	.011	.031	.029	.063	.046	.112			.008	.002				
4	55.17	19.60	3.27	2.74	1.58	3.73	2.27	9.58	0.99		0.69	0.20		CO ₂ none	99.82	
A2. II	.920	.192	.020	.038	.040	.067	.037	.102			.009	.001				
5	58.35	19.83	0.98	2.37	0.90	3.67	3.59	9.10	0.96		0.30	trace		Cl trace	100.05	
A2. II	.973	.194	.006	.033	.023	.066	.058	.097			.004	—				
6	57.58	19.39	3.22	1.62	1.17	4.08	3.12	8.68	0.50	0.44	0.31	0.21		Cl 0.17	100.49	
A2. II	.960	.190	.020	.022	.029	.073	.050	.093			.004	.001				

ORDER 5. PERFELIC. CANADARE—Continued.

SUBBRANG 4. DOSODIC. NORDMARKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
61	I''.(4)5.1.(3)4.	Q 8.34 ac 3.23 or 31.69 di 0.86 ab 49.78 wo 1.74 mt 3.02	Dark Slope, Ascension Island.	R. Reinisch.	R. Reinisch, D. Sudpol. Exp., II, (7), p. 649, 1912.	Trachyte.	
62	I(II).5.1.(3)4.	Q 3.60 ac 0.92 or 30.58 di 6.18 ab 53.45 wo 0.23 mt 3.25 il 0.61	Cross Hill, n. Georgetown, Ascension Island.	R. Reinisch.	R. Reinisch, D. Sudpol. Exp., II, (7), p. 649, 1912.	Katoforite trachyte.	
63	I(II).5.1.(3)4.	Q 3.36 di 6.04 or 30.58 hy 3.27 ab 51.35 mt 0.70 an 0.56	Riding School, Ascension Island.	R. Reinisch.	R. Reinisch, D. Sudpol. Exp., II, (7), p. 650, 1912.	Trachyte pumice.	

SUBBRANG 5. PERSODIC. TUOLUMNOSE. (C. I. P. W., 1902.)

1	I.5.1.5.⊙	Q 0.18 ac 1.39 or 0.56 di 1.30 ab 95.37 wo 0.12 mt 0.23 il 0.15 hm 0.32 ap 0.34	Moccasin Creek, Tuolumne County, California.	H. N. Stokes.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 727, 1896.	Soda syenite porphyry.	Also in A. G., XVII, p. 387, 1896. In W. T., p. 199.
2	I(II).5.1''.(4)5.	Q 2.58 di 5.18 or 8.34 wo 0.46 ab 73.36 mt 0.70 an 4.17 il 3.34 hm 1.60	Tingsvallakulla, Gellivare, Sweden.	G. Nyblom.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Syenite.	
3	I.5.1.5.⊙	or 2.78 di 3.34 ab 89.34 ol 2.43 an 1.39 il 0.46 ne 1.28	Koswinsky, Kitlim District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. Min. Fr., XXXIII, p. 369, 1910.	Albiteite.	
4	I''(5)6).1.5.	or 4.45 ac 6.47 ab 73.88 di 0.68 ne 9.94 wo 0.81 Z 1.46 mt 1.39	Mariupol, Sea of Azof, Russia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XXI, p. 241, 1902.	Mariupolite.	Not typical, too little nephelite. In W. T., p. 199.
5	I.5.1.5.⊙	Q 5.58 hy 4.30 or 0.56 ab 86.46 an 1.95 C 1.12	Moolyella, Pilbara, West Australia.	E. S. Simpson.	A. G. Maitland, W. Aust. G. S. B. 15, p. 12, 1904.	Pegmatite.	

SUBBRANG 2. DOPOTASSIC. VULSINOSE. (C. I. P. W., 1902.)

1	I''5.2.2.	or 54.49 di 3.24 ab 22.01 hy 1.00 an 12.51 mt 0.70 il 1.52 hm 3.68 ap 0.34	Bolsena, n. Orvieto, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 31, 1906.	Vulsinite.	Incomplete in J. G., IV, p. 552, 1896. TiO ₂ and P ₂ O ₅ from next. In W. T., p. 199.
2	I''5.2.2(3).	or 50.60 di 3.89 ab 24.10 ol 0.70 an 13.34 mt 1.16 ne 1.14 il 1.52 hm 2.24 ap 0.40	Bolsena, n. Orvieto, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 31, 1906.	Vulsinite.	Same locality as above, different specimen.
3	I''5(6).2.2.	or 62.27 di 2.44 ab 5.76 ol 2.42 an 12.51 mt 2.55 ne 9.94 il 1.22 ap 0.65	Sorgente di Garig- nano, Lake Vico, n. Viterbo, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 36, 1906.	Viterbite (leucite trachyte).	
4	I(II).5.2.2.	or 56.71 di 2.22 ab 11.53 ol 2.95 an 14.73 mt 4.64 ne 4.28 il 1.37 ap 0.40	Below San Rocco, Monte Vico, n. Viterbo, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 36, 1906.	Viterbite (leucite trachyte).	Incomplete in J. G., V, p. 370, 1897. In W. T., p. 199.
5	I(II).5''2.2(3).	or 53.93 di 6.28 ab 17.29 ol 1.62 an 10.84 mt 1.39 ne 7.10 il 0.61	Astroni Volcano, Phlegrean Fields, Italy.	C. Riva.	De Lorenzo and Riva, Atti. Ac. Sc. Nap., XI, p. 19, 1902.	Vulsinite. pumice.	
6	I(II).5.2.2(3).	or 51.71 di 4.32 ab 21.48 ol 0.63 an 13.62 mt 4.18 ne 1.98 il 0.61 hl 0.23 hm 0.32 ap 0.40	Caprara, Astroni Volcano, Phlegrean Fields.	C. Riva.	De Lorenzo and Riva, Atti. Ac. Sc. Nap., XI, p. 43, 1902.	Vulsinite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	57.50	18.80	4.37	0.62	1.20	3.84	3.16	8.39	0.61	0.38	0.50	0.28	0.57	Cl 0.03	100.21	
A2. II	.958	.184	.028	.009	.030	.069	.051	.089			.006	.002	.008			
8	58.44	20.79	0.58	3.85	0.43	2.24	2.85	9.83	1.36						100.37	
A3. III	.974	.204	.004	.054	.011	.040	.046	.104								
9	55.00	20.91	2.05	3.73	0.63	3.32	2.80	8.66	1.87		0.35	trace	0.77	CO ₂ 0.33 S 0.61	101.03	
B2. III	.917	.205	.013	.051	.016	.059	.045	.092			.004	—	.011			

RANG 2. DOMALKALIC. PULASKASE.

1	60.75	19.55	1.54	2.98	0.81	2.29	4.89	5.90	0.08	0.24	0.63	0.13	trace		99.79	
A2. II	1.013	.192	.010	.041	.020	.041	.079	.063			.008	.001	—			
2	63.45	18.31	0.42	3.56	0.35	2.93	5.06	5.15	0.30		0.07	trace	none	BaO 0.13	99.73	2.717
A2. II	1.058	.179	.003	.050	.009	.051	.081	.056			.001	—	—			200
3	64.64	15.92	1.14	4.65	0.23	2.12	4.38	6.06	0.43	0.04	0.42	trace	0.03	ZrO ₂ trace S 0.06 BaO 0.10	100.22	
A1. I	1.077	.156	.007	.065	.006	.038	.071	.065			.005	—	—			
4	63.65	20.46	2.20	n. d.	1.50	3.28	4.75	4.58	0.42						100.84	
A4. IV	1.061	.200	.013	(.026)	.038	.058	.076	.049								
5	61.18	19.72	3.71	1.32	trace	2.64	5.28	5.66	0.32						99.83	
A3. III	1.020	.193	.023	.018	—	.047	.085	.061								
6	60.20	20.40	1.74	1.88	1.04	2.00	6.30	6.07	0.23	0.10	0.14	0.15	trace	CO ₂ none ZrO ₂ trace SO ₃ 0.13 Cl 0.09 S none	100.47	
A1. I	1.003	.200	.011	.026	.026	.036	.102	.065			.002	.001	—			
7	60.03	20.76	4.01	0.75	0.80	2.62	5.96	5.48	0.53	0.06		0.07	trace		101.07	2.656
B3. IV	1.001	.203	.025	.010	.020	.046	.096	.059				—	—			
8	65.54	17.81	0.74	1.15	0.98	1.92	5.55	5.58	0.54		0.11		trace	Li ₂ O trace	99.92	
A3. III	1.092	.175	.005	.016	.025	.034	.090	.059			.001		—			
9	57.18	18.54	3.65	1.15	0.69	2.31	4.48	8.58	2.10		0.30	0.05	trace	SO ₃ 0.06 Cl 0.77 BaO 0.49 SrO trace	100.35	
A1. I	.953	.182	.023	.016	.017	.041	.072	.091			.004	—	—			
10	56.45	20.08	1.31	4.39	0.63	2.14	5.61	7.13	1.51	0.26	0.29	0.13	0.09	Cl 0.43 NiO trace	100.45	
A2. II	.941	.197	.008	.061	.016	.038	.090	.075			.004	.001	.001			
11	61.41	17.99	2.93	1.39	1.20	4.75	4.01	4.59	0.68	0.11	0.53	0.19	0.16	SO ₃ 0.05 BaO 0.11 SrO 0.1	100.24	
A1. I	1.024	.176	.018	.019	.030	.085	.065	.049			.007	.001	.002			
12	60.89	17.14	3.32	0.95	1.16	3.58	4.54	5.71	1.22	0.39	0.49	0.27	0.09	NiO 0.19	99.94	
A2. II	1.015	.168	.020	.015	.029	.064	.071	.061			.006	.002	.001			

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 2. DOPOTASSIC. VULSINOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	I(II).5.2.2(3).	or 49.48 di 3.89 ab 25.15 ol 0.84 an 12.23 mt 0.70 ne 0.85 il 0.91 hm 4.00 ap 0.67	Pagliaroni, Astroni Volcano, Phlegrean Fields.	C. Riva.	De Lorenzo and Riva, Atti. Ac. Sc. Nap., XI, p. 48, 1902.	Vulsinite.	
8	I''5.2.2.	or 57.82 ol 5.87 ab 19.39 mt 0.93 an 11.12 ne 2.56 C 1.43	Near Kandy, Ceylon.	W. C. Hancock.	A. K. Coomaraswamy, Geol. Mag., (IV), X, p. 349, 1903.	Corundum syenite.	
9	I(II).5.2.2''.	or 51.15 ol 5.71 ab 16.77 mt 3.02 an 16.40 il 0.61 ne 3.69 C 0.92	Regatta Point, Port Cygnet, Tasmania.	F. P. Paul.	F. P. Paul, T. M. P. M., XXV, p. 295, 1906.	Mica sölv- bergite.	

SUBRANG 3. SODIPOTASSIC. PULASKOSE. (C. I. P. W., 1902.)

1	I''5.''2.3.	Q 1.56 hy 7.15 or 35.03 mt 0.46 ab 41.39 il 1.22 an 10.56 ap 0.34 C 1.22	Mount Belknap, New Hampshire.	H. S. Washing- ton.	Pirsson and Washing- ton, A. J. S., XXII, p. 450, 1906.	Syenite.	In W. T., p. 199.
2	I''5.2.3''.	Q 5.06 di 2.15 or 31.14 hy 6.11 ab 42.44 mt 0.70 an 11.63	Loon Lake, Franklin County, New York.	E. W. Morley.	H. P. Cushing, B. G. S. A., X, p. 183, 1899.	Augite syenite.	In W. T., p. 199.
3	I(II).(4)5.(1)2.3.	Q 8.64 di 4.40 or 36.14 hy 5.28 ab 37.20 mt 1.62 an 5.56 il 0.76	Black Horse Hill, Pennsylvania.	R. C. Wells.	F. Bascom, U. S. G. S. rec. lab.	Granite gneiss.	
4	I''5.2''3(4).	Q 7.86 hy 7.23 or 27.24 ab 39.82 an 16.12 C 1.73	Coweta station, Coweta County, Georgia	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 93, 1902.	Granite.	Also in J. G., IX, p. 119, 1901.
5	I.5.2.3''.	Q 3.00 mt 4.18 or 33.92 hm 0.80 ab 44.54 an 13.07	Near Wausau, Wisconsin.	W. W. Daniells.	S. Weidman, J. G., XII, p. 552, 1904.	Quartz syenite.	
6	I''5.''2.3(4).	or 36.14 ol 3.15 ab 42.44 mt 2.55 an 9.17 il 0.30 ne 5.96 ap 0.34	Fourche Mountain, n. Little Rock, Arkansas.	H. S. Washing- ton.	H. S. Washington, J. G., IX, p. 609, 1901.	Pulaskite.	In W. T., p. 199.
7	I.5.2.3(4).	or 32.80 ol 1.40 ab 46.11 mt 2.32 an 12.79 hm 2.40 ne 2.27	Fourche Mountain, n. Little Rock, Arkansas.	R. N. Brackett.	J. F. Williams, Ark. G. S. A. R. (1890), II, p. 88, 1891.	Pulaskite.	In W. T., p. 199.
8	I''5.(1)2.3(4).	Q 6.18 di 1.79 or 32.80 hy 2.96 ab 47.16 mt 1.16 an 7.22 il 0.15	Highwood Peak, Highwood Moun- tains, Montana.	Pirsson and Mitchell.	Weed and Pirsson, A. J. S., I, p. 295, 1896.	Quartz syenite.	Also in Pirsson, U. S. G. S. B. 237, p. 63, 1905. In W. T., p. 199.
9	I''5.''2.3.	or 50.60 di 2.38 ab 26.20 ol 0.42 an 8.34 mt 2.73 ne 3.12 il 0.61 hl 1.29 hm 1.76	South Mountain, Highwood Moun- tains, Montana.	H. W. Foote.	L. V. Pirsson, U. S. G. S. B. 237, p. 123, 1905.	Sölvbergite porphyry.	In W. T., p. 199.
10	I''5(6)''2.3.	or 41.70 ol 6.22 ab 28.82 mt 1.86 an 9.73 il 0.61 ne 8.24 hl 0.70	Square Butte, Highwood Moun- tains, Montana.	W. H. Melville.	Lindgren and Melville, A. J. S., XLV, p. 296, 1893.	Sodalite syenite.	In W. T., p. 201.
11	I(II).(4)5.2(3).3''.	Q 9.96 di 4.32 or 27.24 hy 1.00 ab 34.06 mt 2.73 an 17.24 il 1.06 hm 0.96 ap 0.34	Gem, Coeur d'Alene District, Idaho.	G. Steiger.	Ransome and Calkins, U. S. G. S. P. P. 62, p. 47, 1908.	Quartz monzonite.	
12	I(II)''5.2.3.	Q 6.06 di 4.54 or 33.92 hy 0.80 ab 37.20 mt 2.32 an 10.01 il 0.91 hm 1.60 ap 0.67	Stinkingwater River, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 349, 1899.	Quartz banakite.	Also in J. G., III, p. 947, 1895. In W. T., p. 201.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13	57.73	18.93	1.97	1.92	0.91	2.78	5.52	6.11	2.93	0.22	0.33	0.25	0.06	CO ₂ 0.26 ZrO ₂ trace FeS ₂ 0.02 Cr ₂ O ₃ trace V ₂ O ₅ 0.01 BaO 0.16 SrO 0.09	100.20	
A1. I	.962	.185	.013	.027	.023	.050	.089	.065			.004	.002	—			
14	55.14	18.98	2.60	1.62	0.32	3.96	5.38	6.64	3.70	0.63	0.50	0.17	trace	SO ₂ 0.10 Cl trace S 0.03	99.77	
A2. II	.919	.186	.016	.022	.008	.071	.087	.070			.006	.001	—			
15	65.41	18.78	0.94	0.72	0.16	1.58	5.91	5.41	1.38			trace	trace		100.29	
A3. III	1.090	.184	.006	.010	.004	.029	.095	.058				—	—			
16	58.94	17.19	2.63	1.98	1.52	4.45	4.20	3.90	4.53		0.27	0.23	0.10		99.94	
A2. II	.982	.169	.016	.028	.038	.079	.068	.041			.003	.002	.001			
17	62.64	17.82	3.91	0.31	0.47	3.22	4.47	4.99	0.65	0.58	0.59	0.25	0.04	ZrO ₂ 0.08 BaO 0.28 SrO 0.07	100.37	
A1. I	1.044	.175	.024	.004	.012	.057	.073	.053			.007	.002	—			
18	62.04	17.63	1.98	1.57	0.99	1.75	4.73	6.74	1.18	0.12	0.72	0.17	trace	CO ₂ 0.20	99.82	2.497
A2. II	1.034	.173	.013	.022	.025	.031	.076	.071			.009	.001	—			
19	62.91	16.43	3.27	0.99	1.36	3.08	5.13	4.81	0.14		1.41	0.25	0.16	SO ₂ 0.05 BaO 0.06	100.05	
A1. I	1.049	.161	.021	.014	.034	.055	.082	.051			.013	.002	.002			
20	62.50	19.10	2.27	1.51	0.38	1.67	5.22	5.25	1.25		0.83				100.16	
A3. III	1.042	.187	.014	.021	.010	.030	.084	.056			.010					
21	60.20	20.50	1.58	1.01	0.39	1.96	4.75	5.57	3.00		0.51				99.47	
A3. III	1.003	.201	.010	.014	.010	.035	.077	.060			.006					
22	62.60	18.07	2.28	2.25	1.16	2.27	5.49	5.22	0.50						99.84	
A3. III	1.043	.177	.014	.031	.029	.041	.089	.056								
23	61.51	17.31	3.50	3.03	0.69	2.41	4.53	5.18	0.59		0.39		0.46		99.60	
A2. II	1.025	.170	.022	.042	.017	.043	.073	.055			.005		.007			
24	63.57	19.69	1.26	0.96	0.43	1.37	6.08	5.86	0.79	0.01	0.28	trace	trace	CO ₂ 0.02	100.32	
A3. III	1.060	.193	.008	.014	.011	.025	.098	.063			.004	—	—			
25	61.25	17.70	2.95	1.40	0.07	3.10	3.40	8.08	1.35		0.05	1.10			100.45	
A2. II	1.021	.174	.018	.019	.002	.055	.055	.086			—	.008				
26	62.26	18.10	2.28	2.87	1.22	1.32	4.70	6.05	0.60	0.03				SO ₂ 0.44	99.87	
A3. III	1.038	.177	.014	.040	.031	.023	.076	.065								
27	59.95	17.87	4.66	2.59	1.21	2.75	3.02	6.88	0.74						99.68	
A3. III	.999	.175	.029	.036	.030	.049	.048	.073								

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 3. SODIUM-POTASSIC. PULASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	I''5.2.3.	or 36.14 di 2.72 ab 38.77 ol 1.76 an 8.62 mt 3.02 ne 4.26 il 0.61 ap 0.67	Dike Mountain, Yellowstone National Park.	W. F. Hille- brand.	Hague and Jaggar, U. S. G. S. B. 168, p. 98, 1900.	Biotite trachyte.	In W. T., p. 201.
14	I(II).5(6).2''3.	or 38.92 di 1.73 ab 28.30 wo 3.94 an 8.06 mt 3.71 ne 9.37 il 0.91 ap 0.34	Warren Peaks, Sundance quad- rangle, Wyoming.	G. Steiger.	W. S. T. Smith, U. S. G. S. Fol. 127, p. 6, 1905.	Trachytoid phonolite.	
15	I''5.''2.3(4).	Q 6.36 hy 0.93 or 32.25 mt 1.39 ab 49.78 an 8.06 C 0.20	Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, (II), p. 324, 1896.	Trachyte.	Also in Proc. Colo. Sc. Soc., II, p. 233, 1887. In W. T., p. 201.
16	I(II)''5.2(3).3(4).	Q 8.88 di 2.65 or 28.36 hy 3.86 ab 35.63 mt 3.71 an 16.68 il 0.46 ap 0.67	Pringle Hill, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, (II), p. 324, 1896.	Andesite.	In W. T., p. 201.
17	I''(4).5.2.3.	Q 10.62 hy 1.20 or 30.02 il 0.61 ab 37.73 hm 3.91 an 13.62 tn 0.20 ru 0.16 ap 0.67	Bare Hills, Pikes Peak, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 148, p. 163, 1897.	Andesite.	In W. T., p. 201.
18	I''5.(1)2.3.	Q 4.38 di 0.43 or 39.48 hy 2.30 ab 39.82 mt 3.02 an 7.23 il 0.30 ap 0.34	Near Midway, Rock Creek, Midway Moun- tains, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38, (1), p. 419, 1912.	Pulaskite porphyry.	
19	I(II)''5.''2.3(4).	Q 8.46 di 4.32 or 28.36 hy 1.40 ab 42.97 mt 0.76 an 7.78 il 1.98 hm 2.88 ap 0.67	Grand Cascade, Mont Dore, Auvergne.	P. Holland.	Dickson and Holland, Fr. Liv. G. Soc., VIII, p. 412, 1899.	Trachyte.	Not in W. T.
20	I''5.''2.3(4).	Q 7.92 hy 1.00 or 31.14 mt 2.55 ab 44.01 il 1.52 an 8.34 hm 0.46 C 1.73	Puy Gros, Mont Dore, Auvergne.	Pisani.	Michel Levy and Lacroix, C. R., CXLVIII, p. 1723, 1909.	Trachyte.	
21	I.5.2.3''.	Q 6.06 hy 1.00 or 33.36 mt 1.86 ab 40.35 il 0.91 an 9.73 hm 0.32 C 2.96	Lusclade, Mont Dore, Auvergne.	Pisani.	Michel Levy and Lacroix, C. R., CXLVIII, p. 1723, 1909.	Phonolitic trachyte.	
22	I(II).5.''2.3(4).	Q 3.24 di 2.04 or 31.14 hy 4.15 ab 46.64 mt 3.25 an 8.90	Ullernas, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 49, 1890.	Akerite porphyry.	In W. T., p. 201.
23	I(II)''5.2.3''.	Q 8.16 hy 4.34 or 30.58 mt 5.10 ab 38.25 il 0.76 an 11.68	Waggeryd, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 268, 1906.	Granite.	
24	I.5.(1)2.3(4).	Q 1.86 hy 1.36 or 35.03 mt 1.86 ab 51.35 il 0.61 an 6.95 C 0.71	Gleeser Feld, Laacher See, Rheinland.	R. Brauns.	R. Brauns, N. J. B. B., XXXIV, p. 151, 1912.	Sanidinite.	
25	I''5.''2.(2)3.	Q 6.42 hy 0.21 or 47.82 mt 4.18 ab 28.82 il 0.15 an 7.78 ap 2.69 C 0.51	Scheerkopf, Siebengebirge, Rheinland.	Geller.	Laspeyres, Vh. Nh. Ver. Bonn, LVII, p. 561, 1900.	Trachyte.	P ₂ O ₅ high? Not in W. T.
26	I(II).5.(1)2.3.	Q 5.34 hy 6.53 or 36.14 mt 3.25 ab 39.82 an 6.39 C 1.33	Korna, Verespatak, Hungary.	B. Ruzitska.	G. v. Szadeczky, F. K., XXXIX, p. 457, 1909.	Dacite.	
27	I(II)''5.2.(2)3.	Q 8.28 hy 3.92 or 40.59 mt 6.73 ab 25.15 an 13.62 C 0.51	Malga Gardone, Predazzo, Tyrol.	J. A. Ippen.	J. A. Ippen, N. J., 1903, II, p. 13.	Syenite.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC, PULASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
28	58.86	17.24	5.75	1.52	1.76	2.72	2.87	6.54	1.41		0.78	0.39		CO ₂ 0.17	100.01	
A2. II	.981	.169	.036	.021	.044	.048	.047	.069			.010	.003				
29	62.66	17.34	0.54	2.16	1.44	3.17	4.51	6.34	1.67			trace	0.12		99.94	
A?3. III	1.044	.170	.003	.030	.036	.057	.072	.067				—	.002			
30	55.07	20.83	2.12	1.99	1.00	3.37	4.00	8.65	0.77	0.59	0.82	0.19		CO ₂ none ZrO ₂ 0.04 SO ₂ trace CaO 0.03 BaO 0.20 SrO 0.06	99.73	
A1. I	.918	.204	.013	.028	.025	.060	.065	.093			.010	.001				
31	58.61	20.20	0.47	2.48	1.51	2.66	5.20	8.66	n. d.		0.39	trace		Cl 0.64	100.82	
A2. II	.977	.198	.003	.035	.038	.048	.084	.092			.005	—			(100.62)	
32	57.60	19.43	2.49	1.92	1.06	4.17	3.55	8.71	0.32	0.32	0.46	0.20	0.23		100.50	
A2. II	.960	.190	.016	.026	.027	.075	.057	.093			.006	.001	.003			
33	61.07	19.47	2.50	0.71	0.46	1.45	4.84	7.07	0.96	0.42	0.69	0.04			99.68	
A2. II	1.018	.191	.016	.010	.012	.026	.078	.076			.009	—				
34	58.43	18.58	3.00	1.22	0.13	3.50	4.78	5.82	0.94	1.63	1.11	0.19	0.09	CO ₂ none ZrO ₂ 0.24 SO ₂ 0.11 BaO 0.14 SrO 0.06	99.97	
A1. I	.974	.182	.019	.017	.003	.063	.077	.062			.014	.001	.001			
35	60.34	20.69	1.53	1.15	0.38	1.97	3.94	8.15	1.38		0.62				100.15	
A3. III	1.006	.203	.010	.016	.010	.036	.064	.087			.008					
36	58.85	20.86	1.34	1.04	0.36	1.50	6.74	7.01	1.15		0.50	0.02		Cl .060	100.01	
A2. II	.981	.204	.008	.014	.009	.027	.109	.074			.006	—				
37	59.16	19.13	1.70	3.04	0.61	2.83	5.56	5.20	1.44	0.25	0.51	0.23			99.75	
A2. II	.986	.187	.011	.042	.016	.050	.090	.055			.006	.002				
38	64.24	17.35	2.33	2.05	1.04	3.52	4.79	5.02	0.35		0.25	0.17			101.01	
B2. III	1.071	.170	.014	.029	.026	.063	.077	.053			.003	.001				
39	62.88	17.47	1.17	2.94	0.73	2.17	4.55	5.80	1.55		0.91	0.31	trace		100.48	
A2. II	1.048	.171	.008	.041	.018	.039	.074	.062			.011	.022	—			
40	61.83	17.08	2.14	2.71	0.89	2.24	4.93	5.37	1.60		0.30	0.35	0.12		99.56	
A2. II	1.031	.167	.013	.038	.022	.040	.079	.057			.004	.003	.002			
41	58.79	19.55	1.82	1.43	0.74	2.37	4.21	8.69	1.05	0.06	0.54	0.11	0.40	ZrO ₂ none Cl 0.12 F 0.03 S 0.02 Cr ₂ O ₃ none BaO 0.08 SrO 0.12	100.13	
A1. I	.980	.192	.011	.019	.019	.043	.068	.093			.007	.001	.006			
42	58.61	21.62	1.16	0.79	0.16	1.71	6.60	6.82	1.42	0.19	0.17	0.04	0.40	ZrO ₂ 0.01 Cl 0.07 F 0.01 S trace Cr ₂ O ₃ none BaO 0.01 SrO 0.02	99.81	
A1. I	.977	.212	.007	.011	.004	.030	.106	.072			.002	—	.006			

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 3. SODIPOTASSIC. PULASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
28	I(II).(4)5.2.(2)3.	Q 8.70 hy 4.40 or 38.36 mt 4.87 ab 24.63 hm 2.40 an 13.34	Capello Peak, Predazzo, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak. Wiss., 1904, p. 81.	Bostonite.	
29	I(II).5.2.3.	Q 3.42 di 5.94 or 37.25 hy 4.51 ab 37.73 mt 0.70 an 8.62	Monte Ciliano, n. Viterbo, Italy.	L. Ricciardi.	A. Verri, B. Soc. G. It., VIII, p. 403, 1889.	Trachyte andesite.	In W. T., p. 201.
30	I''5(6).2.''3.	or 51.71 di 2.22 ab 14.15 ol 1.35 an 12.79 mt 3.02 ne 10.79 il 1.52 ap 0.36	Proceno, n. Acqua- pendente, Lake Bolsena, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 43, 1906.	Leucite trachyte.	
31	I.5(6)''2.3.	or 51.15 di 3.89 ab 20.44 ol 4.00 an 8.62 mt 0.70 ne 10.22 il 0.76 hl 1.05	Pollena, Monte Somma, Vesuvius.	Pisani.	A. Lacroix, Nouv. Arch. Mus., (4), IX, p. 138, 1907.	Phonolitic trachyte.	
32	I(II).5''2.(2)3.	or 51.71 di 6.83 ab 19.12 mt 3.71 an 11.12 il 0.91 ne 5.82 ap 0.34	Rotondella, Astroni Volcano, Phlegrean Fields, Italy.	C. Riva.	Di Lorenzo and Riva, Att. Ac. Sc. Nap., XI, p. 52, 1902.	Vulsinite.	
33	I.5.(1)2.3.	Q 2.52 hy 1.20 or 42.26 mt 0.23 ab 40.87 il 1.37 an 7.23 hm 2.40 C 1.12	Sennariolo, Monte Ferru, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXIX, p. 517, 1915.	Trachyte.	
34	I''5.2.3.	Q 2.04 di 0.65 or 34.47 wo 1.63 ab 40.35 mt 0.93 an 11.95 il 2.13 hm 2.56 ap 0.34	Cuglieri, Monte Ferru, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXIX, p. 517, 1915.	Trachyte.	
35	I.5.2.''3.	Q 1.08 hy 1.00 or 48.37 mt 1.86 ab 33.54 il 1.22 an 10.01 hm 0.32 C 1.63	Mont Caffé, Sao Thomé Island, Guinea Coast.	A. Lindner.	W. Boese, N. J. B. B., XXXIV, p. 259, 1912.	Aegirite trachyte.	3 decimals.
36	I.5(6).(1)2.3(4).	or 41.14 ol 0.63 ab 36.15 mt 1.86 an 7.51 il 0.91 ne 9.09 hl 0.94 C 0.20	Tamara, Los Islands, Guinea Coast.	Lassieur.	A. Lacroix, Nouv. Arch. Mus., III, p. 64, 1911.	Nephelite syenite.	Also in B. Soc. Fr. Min., XXXV, p. 20, 1912.
37	I''5.2.3(4).	or 30.58 di 0.25 ab 47.16 hy 2.38 an 11.68 ol 1.78 mt 2.55 il 0.91 ap 0.67	Mount Tsarakanina, Madagascar.	Boiteau.	A. Lacroix, pers. com., 1913.	Phonolitic trachyte.	
38	I(II).(4)5.2.3''.	Q 9.18 di 4.51 or 29.47 hy 1.99 ab 40.35 mt 3.25 an 11.12 il 0.46 ap 0.34	Ilaka, Antsirabe, Madagascar.	Not stated.	Dupare et al., Mem. Soc. Ph. Gen., XXXVI (3), p. 303, 1910.	Granite.	
39	I''5.2.3.	Q 7.6 hy 4.70 or 34.47 mt 1.86 ab 38.77 il 1.67 an 8.90 ap 0.67 C 0.81	Tohuki-yama, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sc. Rep. Tohoku Un. (2), I, p. 47, 1913.	Trachyte.	
40	I(II).5''2.3''.	Q 6.48 hy 5.24 or 31.99 mt 3.02 ab 41.39 il 0.61 an 8.62 ap 1.01	Kurokimara, Dozen, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sc. Rep. Tohoku Un. (2), I, p. 33, 1913.	Quartz syenite.	
41	I''5.''2.''3.	or 51.71 di 2.69 ab 25.15 ol 1.11 an 8.62 mt 2.55 ne 5.68 il 1.06 ap 0.34	Gentungen, Pic de Maros, Celebes.	E. W. Morley.	Iddings and Morley, J. G., XXIII, p. 240, 1915.	Trachyte.	
42	I.5(6).(1)2.3(4).	or 40.03 ol 1.10 ab 35.11 mt 1.62 an 8.34 il 0.30 ne 11.08 C 0.41	Pic de Maros, Celebes.	E. W. Morley.	Iddings and Morley, J. G., XXIII, p. 240, 1915.	Sodalite trachyte.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
43	57.15	19.13	3.24	2.04	2.25	2.90	4.15	7.05	1.57		0.38	0.38			100.19		
A2. II	.952	.187	.020	.028	.056	.052	.067	.075			.005	.003					
44	55.52	20.05	2.52	2.40	2.10	3.15	3.44	7.49	1.42		0.70	0.51			99.30		
B2. III	.925	.196	.016	.033	.053	.056	.055	.080			.009	.004					
45	61.27	16.00	2.59	4.04	0.39	1.93	4.25	6.31	0.36	0.64	1.02	trace	0.10	CO ₂ NiO BaO SrO	0.16 trace none trace	99.06	
B2. III	1.021	.157	.016	.056	.010	.034	.069	.067			.013	—	.001				
46	59.52	18.06	3.76	2.27	0.78	1.98	5.38	5.03	0.96	0.88	0.67	0.27	trace	SO ₃ Cl Li ₂ O	none trace trace	99.56	2.621
A2. II	.992	.177	.024	.032	.020	.036	.087	.053			.008	.002	—				
47	60.58	18.06	3.05	1.38	0.23	1.74	5.01	6.87	0.90	0.99	0.83		0.04	NiO	0.07	99.75	
A2. II	1.010	.177	.019	.019	.006	.031	.081	.073			.010		—				

RANG 2. DOMALKALIC. PULASKASE.

1	57.44	19.43	1.69	2.70	1.16	2.66	6.48	4.28	1.03		1.97	0.60	0.25	Cl	trace	99.69	
A2. II	.958	.190	.011	.038	.029	.047	.105	.046			.025	.004	.004				
2	60.07	19.70	0.21	4.89	0.55	2.27	6.23	4.54	0.48		0.49		0.43			99.86	
A2. II	1.001	.193	.001	.068	.014	.041	.100	.048			.006		.006				
3	58.27	23.75	1.86	n. d.	trace	1.89	6.90	5.17	2.30							100.14	
A4. IV	.971	.232	.012	(.024)	—	.034	.111	.056									
4	59.70	19.52	1.89	4.92	0.78	3.36	5.31	4.14	0.52				0.09			100.23	2.674
A3. III	.995	.191	.012	.068	.020	.060	.085	.044					.001				
5	60.03	21.38	0.50	0.25	0.19	4.59	5.80	2.81	0.66	0.16	3.66	0.39	0.01	CO ₂ S	trace trace	100.90	
A2. II	1.001	.210	.003	.004	.005	.082	.094	.030			.046	.003	—				
6	67.62	16.29	2.31	n. d.	0.78	2.37	5.42	4.58	0.32							99.69	2.687
A4. IV	1.127	.160	.014	(.028)	.020	.042	.090	.048									
7	65.47	17.93	2.15	0.43	0.06	1.10	6.21	5.21	0.41	0.19	0.29	0.19	trace	ZrO ₂ S BaO SrO Ce ₂ O ₃	0.07 trace 0.16 trace 0.05	99.92	2.557
A1. I	1.091	.176	.014	.006	.002	.020	.100	.055			.004	.001	—				
8	57.48	20.04	5.64	3.76	0.40	1.70	7.25	3.65	0.25							100.17	
A3. III	.958	.196	.035	.052	.010	.030	.117	.039									
9	64.40	16.90	1.86	1.37	1.13	2.60	5.79	4.56	0.39	0.16	0.23	0.21	0.07	CO ₂ ZrO ₂ NiO BaO SrO Li ₂ O	none 0.02 none 0.27 0.14 trace	100.10	
A1. I	1.073	.166	.012	.019	.027	.047	.093	.049			.003	.001	.001				

ORDER 5. PERFELIC. CANADARE—Continued.

SUBBRANG 3. SODIPOTASSIC. PULASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
43	I(II).5.2.3.	or 41.70 ol 4.23 ab 33.27 mt 4.64 an 11.68 il 0.76 ne 0.99 ap 1.01 C 0.31	Near Maros Peak, Celebes.	Hinden.	C. Schmidt in Sarasin, Ins. Celebes, IV, p. 14, 1901.	Trachy- dolerite.	
44	I(II).5.2.''3.	or 44.48 ol 4.53 ab 28.56 mt 3.71 an 11.68 il 1.37 ne 0.14 ap 1.34 C 1.84	Maros, Celebes.	Hinden.	C. Schmidt, in Sarasin, Ins. Celebes, IV, p. 20, 1901.	Gaiteite (bostonite).	
45	I(II).''5.(1)2.3.	Q 6.72 di 3.10 or 37.25 hy 3.11 ab 36.15 mt 3.71 an 5.84 il 1.98	Oakey Creek, Nandewar Moun- tains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 903, 1908.	Phonolite.	
46	I(II).5.''2.3(4).	Q 4.44 hy 2.00 or 29.47 mt 5.57 ab 45.59 il 1.22 an 8.06 ap 0.67 C 0.82	Turritable Falls, Upper Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 25, 1912.	Trachyte.	
47	I''5.(1)2.3.	Q 1.56 di 1.30 or 40.59 wo 0.23 ab 42.44 mt 2.09 an 6.39 il 1.52 hm 1.60	Mount Flinders, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXIV, p. 91, 1909.	Trachyte.	

SUBBRANG 4. DOSODIC. LARVIKOSE. (C. I. P. W., 1902.)

1	I(II).5.2.4.	or 25.58 ol 2.64 ab 50.30 mt 2.55 an 9.73 il 3.80 ne 2.56 ap 1.34 C 0.41	Mount Johnson, Quebec.	N. N. Evans.	F. D. Adams, J. G., XI, p. 271, 1903.	Pulaskite.	
2	I''5.2.''4.	or 26.69 ol 7.81 ab 51.35 mt 0.23 an 11.40 il 0.91 ne 0.53 C 0.41	Pic Island, Port Coldwell, Ontario.	E. L. C. Foster.	H. L. Kerr, Rep. Bur. Min. Ont., XIX (I), p. 211, 1910.	Syenite.	
3	I.5''2.''4.	or 31.14 ol 2.45 ab 43.49 mt 2.55 an 9.45 il 3.80 ne 7.95 C 3.16	Methuen Township, Peterborough County, Ontario.	W. G. Miller.	W. G. Miller, Rep. Can. Bur. Mines, VIII (II), p. 207, 1899.	Nephelite syenite.	In W. T., p. 201.
4	I(II).5.2''.''4.	Q 1.44 hy 9.52 or 24.46 mt 2.78 ab 44.54 an 16.68 C 0.20	Tupper Lake, Franklin County, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus., A. R., LIV (I), p. R69, 1902.	Augite syenite.	Iron oxides corrected; op. cit., LX (2), p. 514, 1907.
5	I.''5.2(3).4.	Q 6.48 hy 0.50 or 16.68 il 0.61 ab 49.25 hm 0.50 an 20.02 ru 3.36 C 1.43 ap 1.01	Roseland, Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, Va. G. S. B. 3A, p. 76, 1913.	Syenite.	
6	I''(4)5.(1)2.(3)4.	Q 11.28 di 4.92 or 26.69 hy 3.21 ab 47.16 an 5.84	Sparta, Hancock County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 175, 1902.	Granite.	Also in J. G., IX, p. 119, 1901.
7	I.''5.(1)2.(3)4.	Q 7.50 hy 0.20 or 30.58 mt 0.46 ab 52.40 il 0.61 an 4.73 hm 1.92 C 0.41 ap 0.34	Iron Mountain, n. Marathon, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 228, p. 75, 1904.	Syenite porphyry.	
8	I(II).5.''2.4.	or 21.68 ol 2.43 ab 54.49 mt 8.12 an 8.34 ne 3.69 C 1.02	Wausau, Wisconsin.	W. W. Daniells.	S. Weidman, J. G., XII, p. 552, 1904.	Syenite.	
9	I(II).''5.(1)2.(3)4.	Q 7.20 di 4.82 or 27.24 hy 1.16 ab 48.73 mt 2.78 an 6.67 il 0.46 ap 0.34	Copper Creek basin, Yellowstone National Park.	W. F. Hille- brand.	Hague and Jaggard, U. S. G. S. B. 168, p. 95, 1900.	Syenite porphyry.	In W. T., p. 201.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
10	63.07	17.47	2.09	1.38	1.44	2.27	5.77	4.59	0.43	0.25	0.38	0.18	0.03	CO ₂ none ZrO ₂ trace FeS ₂ 0.02 Cr ₂ O ₃ trace V ₂ O ₅ trace NiO none BaO 0.32 SrO 0.15	99.84	
A1. I	1.051	.171	.013	.019	.036	.041	.093	.049			.005	.001	—			
11	63.49	18.40	2.44	1.09	0.66	2.30	5.70	4.62	1.04		trace	trace	0.16	CO ₂ trace	99.90	
A3. III	1.058	.180	.015	.015	.017	.041	.092	.049			—	—	.002			
12	60.30	18.12	2.45	1.25	0.28	3.89	5.83	5.01	0.71	0.75	0.55	0.25	0.12	CO ₂ none ZrO ₂ 0.01 SrO 0.06 BaO 0.26	99.84	
A1. I	1.005	.178	.015	.018	.007	.070	.094	.053			.007	.002	.002			
13	56.74	19.32	2.37	1.65	0.27	1.98	8.05	5.88	1.12	0.32	0.40	0.03	0.07	CO ₂ 1.50 ZrO ₂ 0.02 SO ₃ 0.12 F trace S 0.05 BaO 0.16 SrO 0.12	100.17	
A1. I	.946	.189	.015	.023	.007	.036	.130	.063			.005	—	.001			
14	60.98	19.09	1.76	1.15	0.65	3.67	6.70	3.53	0.44	0.48	0.36	0.10	0.15	CO ₂ 0.52 BaO 0.43 SrO 0.28 Li ₂ O trace	100.29	
A1. I	1.016	.187	.011	.016	.016	.066	.108	.037			.005	.001	.002			
15	57.70	19.63	3.30	1.60	1.21	5.14	5.42	3.74	0.24	0.13	1.10	0.29	0.17	CO ₂ none ZrO ₂ none S 0.06 BaO 0.09	99.77	
A1. I	.962	.192	.021	.022	.030	.092	.087	.039			.014	.002	.002			
16	52.24	19.28	4.34	1.13	1.85	4.43	6.34	2.40	4.63	0.80	0.73	0.59	trace	CO ₂ 0.35 BaO 0.36 SrO 0.42	99.89	2.528
A2. II	.871	.189	.027	.016	.046	.079	.102	.026			.009	.004				
17	62.31	18.63	2.38	1.33	0.60	5.91	4.97	3.52	0.07	0.16		0.07			99.98	
A3. III	1.039	.183	.015	.018	.015	.105	.081	.037				—				
18	63.43	18.64	2.78	1.02	1.38	1.68	6.77	3.82	0.24		0.28	0.18	0.09	Cl 0.04 S 0.01	100.36	
A2. II	1.057	.183	.018	.014	.035	.030	.109	.040			.004	.001	.001			
19	63.74	17.35	2.15	1.62	1.06	3.13	5.70	4.36	0.78		0.71	0.05	trace	S 0.03 SrO trace	100.68	2.660
A2. II	1.062	.170	.013	.022	.027	.055	.092	.047			.009	—	—			
20	62.96	21.26	2.48	0.46	0.19	2.81	5.47	3.49	0.88	0.22	0.33				100.55	
A3. III	1.049	.208	.016	.007	.005	.050	.089	.037			.004					
21	65.10	17.70	1.44	1.27	0.79	2.32	6.61	4.30	n. d.		0.53	0.06			100.12	
A2. II	1.085	.174	.009	.018	.020	.041	.106	.045			.007	—				
22	60.10	17.96	1.34	1.53	0.26	2.20	6.25	3.80	5.62		0.46	0.05			99.57	
A2. II	1.002	.176	.008	.021	.007	.039	.101	.040			.006	—				
23	64.44	18.33	2.77	0.13	0.41	1.81	6.04	4.76	0.26		0.65	0.19	0.17	SO ₃ 0.02 Cr ₂ O ₃ none V ₂ O ₅ trace BaO 0.06	100.04	
A1. I	1.074	.180	.018	.002	.010	.032	.097	.060			.008	.001	.002			
24	64.06	20.38	2.35	0.56	0.65	1.33	6.27	4.96	(0.88)		0.19				100.75	
A3. III	1.068	.200	.014	.008	.016	.023	.102	.053			.002					
25	63.10	19.80	0.40	0.81	0.38	2.16	6.12	4.95	0.75		1.47				99.94	
A3. III	1.052	.194	.003	.011	.010	.039	.098	.053			.018					

ORDER 5. PERFELIC. CANADARE—Continued.

SUBBRANG 4. DOSODIC. LARVIKÖSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	I''5.''2.(3)4.	Q 5.70 di 1.94 or 27.24 hy 2.83 ab 48.73 mt 3.02 an 8.06 il 0.76 ap 0.34	Copper Creek basin, Yellowstone National Park.	W. F. Hille- brand.	Hague and Jaggard, U. S. G. S. B. 168, p. 95, 1900.	Quartz syenite.	In W. T., p. 201.
11	I''5.2.(3)4.	Q 6.90 hy 1.96 or 27.24 mt 3.48 ab 48.21 an 10.84	Pringle Hill, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17 (II), p. 324, 1896.	Andesite.	Also in Pr. Colo. Sc. Soc., II, p. 250, 1887. In W. T., p. 201.
12	I(II).5.''2.(3)4.	Q 1.20 di 1.51 or 29.47 wo 3.13 ab 49.25 mt 3.02 an 8.62 il 1.06 hm 0.32 ap 0.67	Idaho Springs, Colorado.	G. Steiger.	S. H. Ball, U. S. G. S. P. P. 63, p. 83, 1908.	Syenite porphyry.	
13	I.5(6).(1)2.''4.	or 35.03 di 1.36 ab 39.30 ol 0.41 an 8.34 mt 3.48 ne 5.96 il 0.76 ne 3.61	Beaver Creek, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Cancrinite syenite.	
14	I''5.2.4.	Q 1.38 di 3.95 or 20.57 wo 0.35 ab 56.59 mt 2.55 an 11.68 il 0.76 ap 0.34	Mount Pennell, Henry Moun- tains, Utah.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 14, p. 227, 1894.	Augite porphyry.	In W. T., p. 201.
15	I(II).5.2(3).4.	Q 1.50 di 4.10 or 21.68 hy 1.10 ab 45.59 mt 1.86 an 18.35 il 2.13 hm 2.40 ap 0.67	Ortiz Mountains, east of Albu- querque, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 234, 1908.	Diorite.	
16	I(II).5.2''4.	or 14.46 di 1.08 ab 47.16 ol 2.80 an 16.96 mt 1.62 ne 3.41 il 1.37 hm 4.64	Shackan, Rock Creek, Midway Mountains, Brit- ish Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38 (I), p. 414, 1912.	Shackanite (analcite rhomben porphyry).	
17	I(II).(4)5.2(3)''4.	Q 8.58 di 3.99 or 20.57 wo 2.55 ab 42.44 mt 3.48 an 18.07	San José, Tamaulipas, Mexico.	G. I. Finlay.	G. I. Finlay, Ann. N. Y. Ac. Sci., XIV, p. 271, 1904.	Andesite.	Also in Tr. Am. Inst. M. E. 1905, 892.,
18	I''5.(1)2.4.	Q 4.44 hy 3.50 or 22.24 mt 2.55 ab 57.11 il 0.61 an 7.51 hm 1.12 C 0.61 ap 0.34	Masafuera, Juan Fernandez Islands, Chile.	N. Sahlbom.	P. D. Quensel, B. G. Inst. Ups., XI, p. 284, 1912.	Soda trachyte.	
19	I''.''5.''2.''4.	Q 6.90 di 5.18 or 26.13 hy 0.30 ab 48.21 mt 3.02 an 8.62 il 1.37	Cerro del Morro, San Luis, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 595, 1906.	Hornblende andesite.	
20	I.(4)5.2.4.	Q 11.28 hy 0.50 or 20.57 mt 0.70 ab 46.63 il 0.61 an 13.90 hm 2.08 C 3.26	Cnoc-na-Sroine, Assynt, Scotland.	A. Gemmel.	A. Gemmel, Tr. Edin. G. Soc., IX (5), p. 418, 1910.	Melanite syenite.	
21	I''5.(1)2.4.	Q 5.58 di 3.92 or 25.02 hy 0.40 ab 55.54 mt 2.09 an 6.39 il 1.06	Puy de Dome, Auvergne.	Pisani.	A. Lacroix, C. R., CXLVII, p. 830, 1908.	Hornblende domite.	
22	I.5.2.4.⊙	Q 4.32 di 0.92 or 22.24 hy 0.70 ab 52.92 mt 1.86 an 9.73 il 0.91	Puy de Dome, Auvergne.	Pisani.	A. Lacroix, C. R., CXLVII, p. 830, 1908.	Domite pumice.	
23	I.''5.''2.''4.	Q 7.44 hy 1.00 or 27.80 il 0.61 ab 50.83 hm 2.77 an 8.06 ru 0.32 C 0.41 ap 0.34	Puy de Sarcoui, Puy de Dome, Auvergne.	P. Holland.	Dickson and Holland, Fr. Liv. G. Soc., VIII, p. 412, 1899.	Domite.	Not in W. T.
24	I.5.(1)2.''4.	Q 4.56 hy 1.60 or 29.47 mt 1.39 ab 53.45 il 0.30 an 6.39 hm 1.28 C 2.24	Pignon, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 328, 1902.	Trachyan- desite.	
25	I.5.2.(3)4.	Q 3.48 hy 1.00 or 29.47 il 1.67 ab 51.35 hm 0.40 an 10.84 ru 0.56 C 0.41	Établissement, Mont Dore, Auvergne.	Pisani.	Michel Levy and Lacroix, C. R., CXLVIII, p. 1723, 1909.	Trachyte.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
26	60.80	18.60	0.38	2.17	1.28	2.78	5.95	4.75	1.25		1.53				99.49	
A3. III	1.013	.182	.002	.031	.032	.050	.096	.051								
27	63.00	18.41	2.05	0.65	0.66	3.02	6.30	5.18	0.55						100.11	
A3. III	1.050	.180	.013	.009	.017	.054	.102	.055								
28	56.19	20.25	2.76	2.32	1.12	4.30	6.33	4.19	0.65		0.57	0.54		SO ₃ 0.16 Cl 0.09	99.47	2.674
A2. II	.937	.198	.017	.032	.028	.077	.102	.045			.007	.004				
29	60.72	19.90	3.56	0.85	1.25	2.75	6.24	4.16	0.61						100.04	
A3. III	1.012	.195	.022	.012	.031	.049	.101	.044								
30	59.38	19.35	4.97	0.13	0.91	4.36	5.15	3.88	0.90		1.36	0.38			100.77	
A2. II	.990	.190	.031	.002	.023	.078	.083	.041			.017	.003				
31	58.82	21.06	3.26	0.70	1.38	3.03	6.83	3.70	1.26						100.04	
A3. III	.980	.207	.020	.010	.035	.054	.110	.039								
32	57.59	22.38	3.09	0.78	2.34	3.23	6.11	3.40	0.70						99.62	
A3. III	.960	.220	.019	.011	.059	.058	.099	.036								
33	57.33	20.30	4.95	1.03	1.93	2.67	6.05	4.76	0.68						99.80	
A3. III	.967	.199	.031	.014	.048	.048	.098	.051								
34	56.85	21.56	3.44	1.14	0.85	5.26	6.07	3.66	0.52						99.35	
B3. IV	.948	.211	.022	.014	.021	.094	.098	.039								
35	57.12	21.69	1.63	3.65	1.55	4.03	5.93	3.48	0.58						99.66	
A3. III	.952	.213	.010	.051	.039	.072	.096	.037								
36	56.31	20.35	2.78	3.49	1.49	3.76	6.01	4.12	n. d.		0.73	0.50		S 0.54	100.08	
A2. II	.938	.200	.018	.049	.037	.067	.097	.044			.008	.004				
37	65.70	17.24	1.56	2.37	1.13	2.64	6.95	1.89	0.58		0.33	trace	trace		100.35	
A3. III	1.095	.169	.010	.033	.028	.047	.112	.020			.004	—	—			
38	65.01	18.27	0.84	0.83	0.80	1.50	6.79	4.34	1.74						100.12	
A3. III	1.083	.179	.005	.011	.020	.027	.109	.046								
39	61.19	21.24	1.62	n. d.	trace	1.87	6.80	5.97	0.93		0.39				100.01	
A4. IV	1.020	.208	.010	(.020)	—	.034	.108	.064			.005					
40	60.85	17.53	3.44	2.43	0.46	1.89	6.13	4.62	1.33		0.46	0.27		FeS ₂ 0.51	99.96	
A2. II	1.014	.172	.021	.033	.012	.034	.098	.049			.006	.002				
41	60.58	19.48	4.71	1.55	0.86	2.74	5.55	3.89	0.63		0.28				100.27	2.667
A3. III	1.010	.191	.029	.022	.022	.049	.090	.041			.004					
42	57.20	20.04	2.90	1.20	0.40	3.19	7.85	4.12	2.20		trace	0.22	trace	SO ₃ 0.16 Cl 0.10	99.42	2.578
A3. III	.953	.196	.018	.017	.010	.057	.127	.043			—	.002	—			

ORDER 5. PERFELIC. CANADARE—Continued.

SUBBRANG 4. DOSODIC. LARVIKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
26	I(II).5.2.(3)4.	Q 0.24 di 3.37 or 28.36 hy 2.89 ab 50.30 mt 0.46 an 9.73 il 2.89	Établissement, Mont Dore, Auvergne.	Pisani.	Michel Levy and Lacroix, C. R., CXLVIII, p. 1723, 1909.	Trachyte.	
27	I''5.(1)2.(3)4.	Q 0.84 di 3.87 or 30.58 wo 1.83 ab 53.45 mt 2.09 an 6.39 hm 0.64	Lusclade, Mont Dore, Auvergne.	Pisani.	Michel Levy and Lacroix, C. R., CXLVIII, p. 1723, 1909.	Aegirite trachyte.	
28	I(II).5''2.4.	or 25.02 di 2.69 ab 42.44 ol 1.70 an 14.45 mt 3.94 ne 5.96 il 1.06 ap 1.34	Ferrera, Columbres Islands, Spain.	R. Pfohl.	F. Becke, T. M. P. M., XVI, p. 177, 1896.	Tephritic trachyte.	In W. T., p. 203.
29	I''5.2.4.	Q 0.78 hy 3.10 or 24.46 mt 2.78 ab 52.92 hm 1.60 an 13.62	Notterö, n. Tönsberg, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 35, 1890.	Rhomben porphyry.	In W. T., p. 203.
30	I(II).5.2''.'4.	Q 5.34 hy 2.30 or 22.80 il 0.30 ab 43.49 hm 4.97 an 18.35 tn 0.39 ru 1.04 ap 1.01	Bollaerene, n. Tönsberg, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 329, 1899.	Tönsbergite.	In W. T., p. 203.
31	I''5.2.4.	or 21.68 ol 2.45 ab 52.40 mt 2.32 an 15.01 hm 1.60 ne 2.84 C 0.41	Slotsberg, n. Tönsberg, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 35, 1890.	Rhomben porphyry.	In W. T., p. 203.
32	I''5.2.4.	or 20.02 ol 4.13 ab 51.88 mt 2.55 an 16.12 hm 1.28 C 2.75	Notterö, n. Tönsberg, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 35, 1890.	Augite syenite.	In W. T., p. 203.
33	I''5.2.(3)4.	or 28.35 ol 3.36 ab 45.06 mt 3.25 an 13.34 hm 2.72 ne 3.40	Notterö, n. Tönsberg, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 35, 1890.	Rhomben porphyry.	In W. T., p. 203.
34	I''5.2(3)'.4.	or 21.68 di 4.42 ab 43.49 mt 3.25 an 20.57 hm 1.28 ne 4.26	Notterö, n. Tönsberg, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 30, 1890.	Laurvikite.	In W. T., p. 203.
35	I''5.2(3)4.	or 20.57 ol 6.91 ab 46.64 mt 2.32 an 20.02 ne 1.99 C 0.82	Frederiksvärn, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 30, 1890.	Laurvikite.	In W. T., p. 203.
36	I(II).5.2.4''.	or 24.46 ol 4.83 ab 44.80 mt 4.18 an 15.01 il 1.37 ne 3.27 ap 1.34 C 0.51	Tunaes, n. Bergen, Norway.	Lillejord.	C. F. Kolderup, Berg. Mus. Aarb., 1903, No. 12, p. 114.	Soda syenite.	
37	I(II).(4)5.2.4(5).	Q 10.32 di 2.29 or 11.12 hy 4.18 ab 58.69 mt 2.32 an 10.29 il 0.61	Suhankojarvi, Finland.	N. Sahlbom.	V. Hackmann, B. Com. G. Fin., No. 15, p. 48, 1905.	Soda granite.	
38	I.5.(1)2.4.	Q 4.56 di 0.68 or 25.58 hy 2.46 ab 57.12 mt 1.16 an 6.67	Frohnfeld, n. Kelberg, Eifel.	K. Vogelsang.	K. Vogelsang, Z. D. G. G., XLII, p. 10, 1890.	Trachyte.	In W. T., p. 203.
39	I.5''.'2.(3)4.	or 35.58 ol 1.53 ab 45.06 il 0.76 an 9.45 ne 6.25 C 0.20	Laacher See, Rheinland.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn, XLVIII, p. 324, 1891.	Sanidinite.	In W. T., p. 203.
40	I''5.(1)2''.4.	Q 3.72 di 0.43 or 27.24 hy 1.79 ab 51.35 mt 4.87 an 6.95 il 0.91 ap 0.67	Sporneiche, Odenwald, Hesse.	W. Sonne.	G. Klemm, Nbl. Ver. Erdk. Darm. (4). XXVI, p. 17, 1905.	Trachyte.	Mean of 3 anal.
41	I''.'5.2''.4.	Q 6.24 hy 2.20 or 22.80 mt 4.18 ab 47.16 il 0.61 an 13.62 hm 1.76 C 1.12	Boscampo, Predazzo, Tyrol.	J. K. Ippen.	J. K. Ippen, N. J. Ch., 1902, p. 372.	Aplite.	
42	I''5(6).(1)2.4.	or 23.91 di 2.16 ab 46.63 wo 1.83 an 7.23 mt 3.94 ne 10.79 hm 0.16 ap 0.67	Viezzena Valley, Predazzo, Tyrol.	M. Dittrich.	Osann and Hlawatsch, T. M. P. M., XVII, p. 560, 1893.	Nephelite syenite porphyry.	In W. T., p. 215.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
43	61.5	19.9	n. d.	1.6	1.1	2.2	7.2	2.8	4.4		0.2				100.9	
B4. IV	1.025	.195	—	.022	.028	.039	.116	.030			.003					
44	60.75	19.81	2.53	1.07	0.78	3.82	5.34	4.69	0.67	0.15					99.61	
A3. III	1.012	.195	.016	.015	.020	.068	.086	.050								
45	61.99	20.14	1.25	2.87	0.38	1.35	6.02	4.87	0.98						99.85	
A3. III	1.033	.197	.008	.040	.010	.024	.097	.052								
46	65.43	17.20	1.57	1.06	0.36	2.14	6.14	3.78	1.82		0.19	0.16	trace	S 0.04	99.94	2.504
A2. II	1.091	.169	.010	.015	.009	.038	.099	.040			.002	.001	—			
47	63.08	19.22	1.99	0.73	0.36	2.09	5.76	4.26	0.58	0.64	0.94	0.42			100.07	
A2. II	1.051	.188	.013	.010	.009	.038	.093	.046			.012	.003				
48	54.20	19.90	2.60	3.65	1.41	3.12	5.42	4.82	3.37		1.15	0.23			99.87	
A2. II	.903	.195	.016	.051	.035	.055	.087	.051			.014	.002				
49	61.98	17.79	3.34	2.61	0.59	2.82	5.59	3.65	0.37		0.72	0.29			99.80	
A2. II	1.033	.174	.021	.036	.015	.050	.090	.039			.009	.002				
50	62.36	17.95	1.55	2.62	0.72	2.75	5.60	4.16	0.87		0.66	0.25	0.48		100.10	
A2. II	1.039	.176	.010	.036	.018	.049	.090	.047			.008	.002	.007			
51	64.4	19.3	2.1	0.5	1.1	3.3	5.7	3.4	0.3						100.1	
B3. IV	1.073	.189	.013	.007	.028	.059	.092	.036								
52	60.10	18.38	2.22	3.34	1.30	2.28	5.30	4.57	0.43	0.96	0.69	0.33	none	SO ₃ Cl Li ₂ O trace none trace	99.90	2.651
A2. II	1.002	.180	.014	.046	.033	.041	.085	.049			.009	.002	—			
53	59.44	17.98	2.28	3.34	0.78	2.32	5.36	4.77	1.57	0.70	0.79	0.30	trace	SO ₃ Cl Li ₂ O none trace trace	99.63	2.590
A2. II	.991	.176	.014	.046	.020	.041	.086	.051			.010	.002	—			
54	57.42	18.83	4.89	3.56	0.59	1.75	6.23	5.46	2.36						101.09	
B3. IV	.957	.185	.031	.050	.015	.031	.100	.058								
55	54.88	22.80	3.66	3.26	0.38	2.24	7.53	3.65	0.91						99.94	
A3. III	.915	.223	.023	.045	.010	.040	.121	.039								
56	66.19	17.45	2.95	n. d.	trace	1.16	5.55	4.90	1.61						99.81	
A4. IV	1.103	.171	.019	(.038)	—	.021	.090	.052								
57	60.83	23.92	0.11	2.14	0.07	3.39	6.11	2.96	0.07	0.12	0.36	0.93		CO ₂ none	100.91	
B2. III	1.014	.234	.001	.029	.002	.061	.098	.032			.005	.007			(100.08)	
58	56.09	20.79	1.54	3.84	1.26	3.18	7.33	3.91	0.39	0.19	1.23	0.38	0.05	Cl 0.17	100.35	
A2. II	.935	.204	.009	.053	.032	.057	.118	.041			.015	.003	—			

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 4. DOSODIC. LARVIKÖSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
43	I.5.2.4.⊙	Q 1.44 hy 5.31 or 16.68 il 0.46 ab 60.78 an 10.84 C 1.02	Ustica, Aeolian Islands.	M. Stark.	M. Stark, T. M. P. M., XXIII, p. 521, 1904.	Pumice.	
44	I''5.2.(3)4.	Q 2.94 di 1.94 or 27.80 hy 1.10 ab 45.06 mt 3.48 an 16.40 hm 0.16	Mount Sopipir, Karabagh, Armenia.	Not stated.	A. S. Ginsberg, Ann. Inst. Polyt. St. Pet., XX, p. 54, 1913.	Vulsinite.	
45	I''5.(1)2.(3)4.	Q 2.94 hy 5.22 or 28.91 mt 1.86 ab 50.83 an 6.67 C 2.45	Furnas, Sao Miguel, Azores.	R. Reinisch.	R. Reinisch, D. Sudpol. Exp., II (7), p. 660, 1912.	Trachyte obsidian.	
46	I.(4)5.''2.4.	Q 10.80 di 1.11 or 22.24 hy 0.76 ab 51.87 mt 2.32 an 8.34 il 0.30 ap 0.34	Gran Curral, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 415, 1911.	Trachyte.	
47	I.(4)5.2.''4.	Q 9.12 hy 0.90 or 25.58 il 1.59 ab 48.73 hm 1.99 an 7.78 ru 0.16 C 2.14 ap 1.01	Ambohivorona, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 176, 1913.	Biotite trachyte.	
48	I(II).5.2.(3)4.	or 28.36 ol 4.59 ab 39.30 mt 3.71 an 13.62 il 2.13 re 3.41 ap 0.67 C 0.82	Andevenanaomby, Bezavona, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 210, 1903.	Nephelite syenite.	Cf. No. 48, III. 6. 4.
49	I''.(4)5.2.4.	Q 9.12 hy 2.29 or 21.68 mt 4.87 ab 47.16 il 1.37 an 11.95 ap 0.37 C 0.20	Brasdes Demoiseles, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 541, 1912.	Phonolitic trachyte.	
50	I(II).5.2.(3)4.	Q 5.58 di 0.71 or 26.13 hy 4.74 ab 47.16 mt 2.32 an 10.84 il 1.22 ap 0.67	Matsu-Shima, Hizen, Kiushiu, Japan.	K. Takayanagi.	S. Kozu, J. G., XIX, p. 559, 1911.	Soda trachyte.	
51	I(4)5.2''4.	Q 9.54 hy 2.80 or 20.02 mt 1.62 ab 48.21 hm 0.96 an 16.40 C 0.20	Merapi Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Breslau, p. 47, 1903.	Andesite.	
52	I(II).5.2.(3)4.	Q 4.44 hy 6.34 or 27.24 mt 3.25 ab 44.54 il 1.37 an 9.45 ap 0.67 C 1.22	Mount Eliza, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 25, 1912.	Trachyte.	
53	I(II).5.2.(3)4.	Q 3.54 hy 5.90 or 28.36 mt 3.25 ab 45.06 il 1.50 an 9.45 ap 0.67 C 0.51	Newham, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 25, 1912.	Trachyte.	
54	I(II).5.(1)2.(3)4.	or 32.25 di 0.92 ab 43.49 ol 2.64 an 7.51 mt 7.19 ne 4.83	Signal Hill, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 402, 1906.	Trachytoid phonolite.	
55	I''5(6).2.4.	or 21.68 ol 2.94 ab 45.06 mt 5.34 an 11.12 ne 9.94 C 2.35	Butlers Peaks, Mount Cargill, Dunedin, New Zealand.	J. A. Bartrum.	J. A. Bartrum, Tr. N. Z. Inst., XLIV, p. 71, 1912.	Phonolite.	
56	I.(4)5.(1)2.(3)4.	Q 10.26 hy 5.02 or 28.91 ab 47.16 an 5.84 C 0.82	Tafagagai, Tutuila, Samoa.	Hobein.	M. Weber, Abh. Bay. Ak. Wiss., XXIV, p. 297, 1909.	Trachyte.	
57	I''5.2.4.	Q 7.98 hy 3.24 or 17.79 mt 0.23 ab 51.35 il 0.76 an 10.56 ap 2.35 C 6.73	Mount Erebus, S. Victoria Land, Antarctica.	Burrows and Walkom.	J. W. E. David, pers. com.	Anorthoclase rock (trachyte).	
58	I(II).5(6).2.4.	or 22.80 di 0.46 ab 42.97 ol 5.00 an 12.51 mt 2.09 ne 10.22 il 2.28 ap 1.01	Cape Royds, Ross Island, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Br. Nat. Ant. Exp., I, p. 113, 1907.	Leucite kenyte.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. PULASKASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	68.28	19.53	0.10	0.11	0.02	2.90	8.53	0.26	0.07		0.15	0.02	trace	S 0.01	99.98	
A2. II	1.138	.191	.001	.002	—	.052	.137	.003			.002	—	—			
2	60.40	19.04	5.61	0.14	0.73	3.09	8.94	0.22	0.17	1.92					100.26	
A3. III	1.007	.187	.035	.002	.018	.055	.144	.002								
3	62.90	22.80	1.05	n. d.	0.40	3.55	8.49	0.53	0.90						100.62	
A4. IV	1.048	.223	.007	(.014)	.010	.063	.137	.005								

RANG 3. ALKALICALCIC. PIEDMONTASE. (WATSON AND TABER, 1912.)

1	59.33	20.46	1.66	0.22	0.83	7.09	2.58	7.03	0.36		0.10	0.05	0.16	CO ₂ trace ZrO ₂ none Cl 0.06 FeS ₂ 0.02 CoO 0.01 BaO none CuO 0.05 Pb 0.01	100.02	
A1. I	.989	.200	.010	.003	.021	.127	.042	.074			.001	—	.002			

RANG 3. ALKALICALCIC. PIEDMONTASE.

1	59.26	23.63	0.30	0.57	0.31	5.93	4.94	4.78	0.74						100.46	2.625
A3. III	.988	.231	.002	.008	.008	.105	.079	.051								31°

RANG 3. ALKALICALCIC. PIEDMONTASE.

1	61.51	23.17	0.37	0.26	0.26	5.96	4.64	3.94	0.32	0.08	0.29	0.10	trace	CO ₂ trace Cl none F none	100.90	
A2. II	1.025	.227	.002	.004	.007	.106	.075	.042			.004	.001	—			
2	59.92	24.23	0.29	0.24	0.23	6.47	5.03	2.93	0.28	0.08	0.22	0.09	trace	CO ₂ trace S trace	100.01	
A2. II	.999	.237	.002	.003	.006	.116	.081	.031			.003	—	—			
3	59.84	20.59	0.55	0.71	0.76	4.48	5.23	2.57	0.75	0.18	3.75	0.35	0.02	CO ₂ trace	99.78	
A2. II	.997	.202	.003	.010	.019	.080	.084	.028			.047	.002	—			
4	54.83	25.49	1.61	1.65	1.96	6.08	5.69	1.87	1.18					CO ₂ 0.18	100.54	
A3. III	.914	.250	.010	.023	.049	.109	.092	.020								
5	58.28	19.37	1.35	2.98	1.30	4.78	4.40	3.75	1.78	0.44	0.96	0.35	0.87	CO ₂ 0.33 BaO 0.25 SrO 0.09	100.48	
A1. I	.971	.190	.009	.042	.033	.086	.071	.040			.012	.002	.001			
6	54.08	21.87	5.22	0.88	2.69	5.53	5.46	2.88	none	0.16	0.98	0.91	0.09	CO ₂ none S none	100.75	
A2. II	.901	.214	.033	.012	.067	.098	.088	.031			.012	.006	.001			
7	57.34	24.90	1.10	0.94	0.25	7.99	5.37	1.23	0.33			trace		S 0.40	100.25	
A2. II	.956	.244	.007	.013	.006	.143	.087	.013								

RANG 3. ALKALICALCIC. PIEDMONTASE.

1	59.71	25.47	0.17	0.22	none	8.24	5.48	0.22	0.86			trace	none	CO ₂ trace Li ₂ O none	100.37	
A3. III	.995	.250	.001	.003	—	.147	.089	.002				—				

ORDER 5. PERFELIC. CANADARE—Continued.

SUBBRANG 5. PERSODIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I.(4)5.2.5.	Q 11.76 il 0.30 or 1.67 hm 0.16 ab 71.79 an 14.18	Flogberg, S. Dalecarlia, Sweden.	R. Mauzelius.	H. E. Johannsen, G. F. F., XXXII, p. 414, 1910.	Plagioclase granulite.	Igneous?
2	I(II).5.2.5.	Q 1.02 di 3.03 or 1.11 hy 0.40 ab 75.45 mt 0.46 an 11.40 hm 5.28	Koppand, Tur- Toroczko Range, Hungary.	S. v. Szent- petery.	S. v. Szentpetery, Mus. Füz., I, p. 238, 1912.	Albite- oligoclase porphyrite.	Cf. No. 29. Porphyrite, p. 1015.
3	I.5.2.5.○.	Q 2.76 hy 2.85 or 2.78 ab 71.78 an 17.51 C 1.84	Jablanica, Narenta River, Herzegowina.	C. v. John?	C. v. John, Jb. Wien. G. R. A., XXXVIII, p. 346, 1888.	Diorite.	In W. T., p. 205.

SUBBRANG 2. DOPOTASSIC. MAZARUNOSE. (C. I. P. W., 1902.)

1	I''5.3.2(3).	Q 3.66 di 4.54 or 41.14 wo 2.55 ab 22.01 mt 0.93 an 23.35 il 0.15 hm 0.96	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Br. G., p. 77, 1908.	Syenite.	In W. T., p. 205.
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SUBBRANG 3. SODIPOTASSIC.

1	I.5.3.3(4).	or 28.36 di 0.92 ab 40.35 ol 0.83 an 28.08 mt 0.46 ne 0.57	Table Mountain, n. Denver, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 148, p. 159, 1897.	Augite andesite.	Pebble. In W. T., p. 205.
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SUBBRANG 4. DOSODIC. PIEDMONTSE. (WATSON AND TABER, 1912.)

1	I.'5.3.(3)4.	Q 6.60 hy 0.70 or 23.35 il 0.61 ab 39.30 hm 0.32 an 28.63 ap 0.34 C 0.11	Rose's mill, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, B. Phil. Soc. Un. Va., I, p. 331, 1913.	Soda syenite.	Also in Va. G. S. B. IIIA, p. 76, 1913.
2	I.5.3.4.○.	Q 5.34 hy 0.60 or 17.24 il 0.46 ab 42.44 hm 0.24 an 32.25 C 0.92	Rose's mill, Nelson County, Virginia.	W. M. Thorn- ton.	W. M. Thornton, A. J. S., XXXI, p. 219, 1911.	Pegmatite.	Also in Va. G. S. B. IIIA, p. 76, 1913.
3	I''(4)5.(2)3.4.	Q 9.60 hy 1.90 or 15.57 mt 0.70 ab 44.01 il 1.06 an 20.29 ru 3.20 C 1.73 ap 0.67	Roseland, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, U. S. G. S. B. 430, p. 208, 1910.	Syenite.	Also in Va. G. S. B. IIIA, p. 76, 1913.
4	I''5.3.4''.	or 11.12 ol 4.76 ab 47.16 mt 2.32 an 30.30 ne 0.57 C 2.96	Horse Race, Menominee River, Wisconsin.	R. B. Riggs.	G. H. Williams, U. S. G. S. B. 62, p. 113, 1890.	Diorite porphyry.	In W. T., p. 205.
5	I(II).5.'3.(3)4.	Q 5.58 hy 6.07 or 22.24 mt 1.86 ab 37.20 il 1.82 an 21.96 ap 0.67	Shields River basin, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 143, 1897.	Diabase porphyrite.	In W. T., p. 205.
6	I''5.3.4.	or 17.24 ol 4.76 ab 45.59 il 1.32 an 21.68 hm 5.22 ne 0.28 ap 2.02 C 1.73	Johnsons Park, Colfax County, New Mexico.	J. G. Fairchild.	J. B. Mertie, U. S. G. S. rec. lab.	Andesite.	
7	I.5.3.'4.	Q 4.38 hy 0.73 or 7.23 mt 1.62 ab 45.59 il 0.76 an 39.75	Alvaerstrommen, n. Bergen, Norway.	Lillejord.	C. F. Kolderup, Berg. Mus. Aarb., 1903, No. 12, p. 36.	Andesine rock.	

SUBBRANG 5. PERSODIC. KITLMOSE. (H. S. WASHINGTON, 1916.)

1	I.(4)5.3(4).5	Q 9.18 hy 0.26 or 1.11 mt 0.23 ab 46.63 an 40.87 C 1.22	Near Pala, San Diego County, California.	W. T. Schaller.	W. T. Schaller, U. S. G. S. rec. lab.	Albitite.	
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CLASS I. PERSALANE—Continued.

RANG 3. ALKALICALCIC. PIEDMONTASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
2	60.80	24.06	0.42	0.39	0.21	5.78	7.64	0.33	0.45						100.08	
A3. III	.1013	.236	.003	.006	.005	.104	.123	.004								
3	59.48	24.10	0.66	n. d.	0.39	8.21	6.67	0.49	n. d.						100.00	
A3. III	.991	.236	.004	(.008)	.010	.146	.107	.005								

RANG 4. DOCALCIC. LABRADORASE. (C. I. P. W., 1902.)

1	53.43	28.01	0.75	n. d.	0.63	11.24	4.85	0.96	trace						99.87	
A4. IV	.891	.275	.005	(.010)	.016	.201	.078	.010								
2	54.62	26.50	0.76	0.57	0.74	9.88	4.50	1.23	0.91						99.71	2.70
A3. III	.910	.260	.005	.008	.019	.177	.073	.013								
3	54.47	26.45	1.30	0.67	0.69	10.80	4.37	0.92	0.53						100.20	2.72
A3. III	.908	.260	.008	.009	.017	.193	.071	.010								
4	51.62	24.25	1.65	5.30	1.21	9.97	3.49	1.27	0.72				0.10		99.78	2.80
A3. III	.860	.237	.010	.074	.030	.179	.056	.014					.001			
5	52.86	26.68	1.03	0.74	0.38	10.93	4.44	0.92	1.49	0.11	0.25	0.33	0.02	CO ₂ trace ZrO ₂ trace S 0.05 BaO 0.03	100.26	
A1. I	.881	.262	.006	.010	.010	.195	.072	.010			.003	.002	—			
6	49.78	29.37	0.34	0.60	1.01	11.86	4.39	0.46	1.76		none		0.08	BaO none SrO none	99.80	2.676
A2. II	.880	.288	.002	.008	.025	.211	.071	.005			—		.001			
7	53.42	28.36	1.80	n. d.	0.31	10.49	4.82	0.84	n. d.						100.04	
A4. IV	.890	.278	.011	(.022)	.008	.187	.077	.009								
8	53.02	27.75	2.92	n. d.	0.93	10.12	4.67	0.81	n. d.		0.12				100.36	
A4. IV	.884	.273	.018	(.036)	.023	.180	.076	.009			.002					
9	52.80	28.57	0.19	0.43	0.27	12.17	4.82	0.56	n. d.			none		S 0.24	100.05	
A3. III	.880	.280	.001	.006	.007	.218	.077	.006				—				
10	47.31	28.52	0.21	4.50	0.19	14.55	2.59	0.81	0.93		0.05	0.08	0.09	ZrO ₂ trace	99.93	2.695
A2. II	.789	.280	.001	.063	.005	.260	.042	.009			—	—	.001			
11	55.01	28.31	n. d.	0.73	0.40	10.42	4.52	0.61							100.00	
A4. IV	.917	.277	—	.010	.010	.185	.072	.006								
12	48.25	27.68	0.31	1.38	3.76	13.15	3.08	0.20	1.64		0.22	0.02	0.06		99.75	
A2. II	.804	.271	.002	.019	.094	.235	.050	.002			.003	—	—			

RANG 5. PERCALCIC. CANADASE. (C. I. P. W., 1902.)

1	45.78	30.39	1.33	1.22	2.14	16.66	1.66	0.10	0.51						99.79	2.83
A3. III	.763	.298	.008	.017	.054	.297	.027	.001								

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG 5. PERSODIC. KITLIMOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
2	I.5.3.5.○.	Q 2.10 hy 0.90 or 2.22 mt 0.70 ab 64.45 an 28.91 C 0.51	Kamenouchky, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. Min. Fr., XXXIII, p. 369, 1910.	Plagioplite.	
3	I.5.3.5.○.	Q 1.86 di 4.15 or 2.78 wo 0.46 ab 56.07 an 34.47	Koswinsky, Kitlim District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. Min. Fr., XXXIII, p. 369, 1910.	Plagioplite.	

SUBRANG 4-5. PRESODIC. LABRADOROSE. (C. I. P. W., 1902.)

1	I.5.''4.(4)5.	or 5.56 di 3.19 ab 35.14 ol 1.00 an 51.99 ne 3.12	Nain, Labrador.	A. Wichmann.	A. Wichmann, Z. D. G. G., XXXVI, p. 491, 1884.	Anorthosite.	In W. T., p. 205.
2	I.5.''4.4(5).	Q 1.26 di 0.65 or 7.23 hy 2.00 ab 38.25 mt 1.16 an 48.37	Mount Marcy, Adirondack Mountains. New York.	A. R. Leeds.	A. R. Leeds, N. Y. St. Mus. A. R. XXX, p. 92, 1878.	Norite.	Not in W. T.
3	I.5.4.(4)5.	Q 1.92 di 3.06 or 5.56 hy 0.40 ab 37.20 mt 1.86 an 49.76	Mount Marcy, Adirondack Mountains, New York.	A. R. Leeds.	A. R. Leeds, N. Y. St. Mus. A. R. XXX, p. 92, 1878.	Norite.	Not in W. T.
4	I(II).5.4.4.	or 7.78 di 0.49 ab 29.34 hy 8.74 an 49.21 ol 1.85 mt 2.32	Rand Hill, Altona, Clinton County, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R. LIII, p. R58 (1899), 1901.	Quartz gabbro.	
5	I.5.''4.(4)5.	Q 0.60 di 1.76 or 5.56 hy 0.30 ab 37.73 mt 1.39 an 50.04 il 0.46 ap 0.67	Forest, Pennsylvania.	W. T. Schaller.	F. Bascom, U. S. G. S. rec. lab.	Anorthosite gneiss.	
6	I.5.4.''5.	or 2.78 ol 2.46 ab 28.82 mt 0.46 an 68.66 ne 4.54	Carlton Peak, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 281, 1900.	Plagioclase.	In W. T., p. 205.
7	I.5.4.(4)5.	or 5.00 ol 2.80 ab 38.25 an 51.99 ne 1.14 C 0.51	Ogne, n. Ekersund, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 96.	Labradorite rock.	In W. T., p. 205.
8	I.5.4.''5.	or 5.00 ol 5.08 ab 37.73 il 0.30 an 50.04 ne 1.14 C 0.82	Near Lister, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 113.	Labradorite rock.	In W. T., p. 205.
9	I.5.4.''5.	or 3.34 di 2.75 ab 34.58 wo 1.04 an 54.77 mt 0.23 ne 3.12	Holsenö, n. Bergen, Norway.	Lillejord.	C. F. Kolderup, Berg. Mus. Aarb., 1903, No. 12, p. 36.	Labradorite rock.	
10	I(II).5.4.''4''.	or 5.00 di 7.63 ab 14.67 ol 3.68 an 63.66 mt 0.23 ne 3.98	Hutberg, Neurode, Silesia.	O. Hauser.	F. Tannhäuser, Sb. Fr. Ak. Wis., 1908, II, p. 1074.	Gabbro aplite.	
11	I.5.4.''5.	Q 3.54 hy 2.32 or 3.34 ab 37.73 an 51.43 C 1.43	Turtschinka, Nolhynia, Russia.	J. Morozewicz.	W. Tarassenko, Ref. N. J., 1899, I, p. 463.	Labradorite rock.	In W. T., p. 205.
12	I(II).5.4.5.	or 1.11 di 3.52 ab 23.06 ol 6.92 an 60.88 mt 0.46 ne 1.70 il 0.46	New Caledonia	Boiteau.	A. Lacroix, C. R., CLII, p. 820, 1911.	Diorite (leu- cocratic).	

SUBRANG. NOT NEEDED.

1	I(II).5.''5.0.	or 0.56 di 5.96 ab 12.05 ol 2.68 an 75.06 mt 1.86 ne 1.14	Burnt Head, Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXVI, p. 340, 1900.	Anorthosite.	In W. T., p. 207.
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CLASS I. PERSALANE—Continued.

RANG 5. PERCALCIC. CANADASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
2	45.0	32.5	0.2	3.0	0.7	17.1	0.8	0.2	n. d.		0.3				100.8	
B3. IV	.750	.319	.001	.042	.018	.305	.013	.002			.004					
3	49.03	27.89	1.47	1.89	1.89	14.11	1.33	0.49	0.74	0.07	0.60	0.29		CO ₂ 0.17 SO ₃ 0.25	100.22	
A2. II	.817	.274	.009	.026	.047	.252	.021	.005			.008	.002				
4	47.11	28.57	2.66	n. d.	0.98	17.01	1.05	0.11	2.11						99.60	2.640
A4. IV	.785	.280	.017	(.034)	.025	.304	.017	.001								
5	47.60	29.77	0.35	1.60	1.21	14.80	1.98	0.34	0.64	0.36	0.10		0.37		99.12	2.70
B2. III	.793	.292	.002	.022	.030	.264	.032	.004			.001		.005			
6	44.59	33.71	0.29	n. d.	0.26	17.80	0.97	0.39	1.63	0.36		0.16			100.16	2.693
A4. IV	.743	.330	.002	(.004)	.007	.313	.016	.004				.001				
7	47.70	32.80	0.90	0.40	0.15	15.50	2.00	0.50	0.50						100.45	2.75
A3. III	.795	.322	.006	.006	.004	.277	.032	.005								
8	45.73	33.54	0.11	0.47	0.29	17.67	1.30	0.14	0.80		0.02	0.03			100.10	
A2. II	.762	.329	.001	.007	.007	.316	.021	.001			—	—				

CLASS I. PERSALANE.

RANG 1. PERALKALIC. MIASKASE. (C. I. P. W., 1902.)

1	53.56	24.43	2.19	1.22	0.31	1.24	6.48	9.50	0.93				0.10			99.96	
A3. III	.893	.240	.014	.017	.008	.022	.104	.101					.001				
2	55.11	21.28	2.64	1.29	0.59	2.82	6.24	8.36	0.58	0.14	0.48	0.27	0.08	CO ₂	0.08	99.96	2.666
A2. II	.919	.209	.017	.018	.015	.050	.101	.089			.006	.002	.001				
3	53.09	21.16	1.89	2.04	0.32	3.30	6.86	8.42	1.13	0.24	0.11	0.15	0.20	CO ₂	0.82	100.48	
A1. I	.885	.208	.012	.028	.008	.059	.111	.089			.001	.001	.003	ZrO ₂	0.04		
														SO ₃	none		
														Cl	0.02		
														S	0.08		
														BaO	0.61		
4	58.89	19.67	1.79	1.23	0.17	1.31	4.41	11.00	1.11				0.59			100.17	2.557
A3. III	.982	.193	.011	.017	.004	.023	.071	.117					.008				
5	55.87	20.85	2.34	1.10	0.48	3.07	4.81	10.49	0.34		0.79	0.11		CO ₂	none	100.55	2.551
A1. I	.931	.204	.015	.015	.012	.055	.077	.112			.010	.001		ZrO ₂	0.07		
														SO ₃	0.14		
														BaO	0.09		
6	54.50	21.70	0.80	1.98	0.54	3.20	6.40	9.14	0.89		0.27			Cl	0.49	99.91	
A2. II	.908	.213	.005	.028	.014	.057	.103	.098			.003						
7	59.47	19.25	1.92	0.94	0.52	1.66	6.86	6.89	1.28		0.66			ZrO ₂	(0.20)	99.65	
A3. III	.991	.189	.012	.013	.013	.030	.111	.073			.008						
8	56.10	22.03	0.30	4.50	0.72	0.70	6.73	6.54	1.40		0.50		0.30			99.82	
A2. II	.935	.216	.002	.063	.018	.013	.108	.069			.006		.004				

ORDER 5. PERFELIC. CANADARE—Continued.

SUBRANG. NOT NEEDED—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
2	I''5.5.0.	or 1.12 hy 5.46 ab 6.81 ol 0.92 an 84.79 mt 0.23 il 0.61	Saint Vincent, West Indies.	Arsandaux.	A. Lacroix, Mont Pelee, p. 598, 1904.	Troctolite.	Inclusion in andesite.
3	I(II)''5.''5.0.	Q 6.90 hy 5.89 or 2.78 mt 2.09 ab 11.00 il 1.22 an 68.11 ap 0.67 C 0.31	Nieder Ramstadt, Bl. Rossdorf, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hess., Bl. Rossdorf, p. 29, 1912.	Gabbro.	
4	I(II).5.''5.0.	Q 3.12 di 9.84 or 0.56 hy 2.02 ab 8.91 an 72.84	Schlumpskoppe, Neurode, Silesia.	O. Hauser.	F. Tannhäuser, Sb. Pr. Ak. Wiss., 1908, II, p. 1071.	Anorthosite.	
5	I''5.(4)5.0.	Q 0.18 di 1.86 or 2.22 hy 5.24 ab 16.77 mt 0.46 an 71.17 il 0.15	Richterhof, S. Bohemia.	E. Donath.	W. Bergt, Z. D. G. G., LXI, p. 78, 1909.	Anorthosite.	
6	I.5.5.0.⊙	or 2.22 di 1.14 ab 7.07 ol 0.48 an 86.18 ap 0.34 ne 0.71	Crocetta, S. Piero in Campo, Elba.	E. Manasse.	E. Manasse, Pr. Soc. Tosc., XII, p. 222, 1901.	Anorthitic inclusions in granite.	
7	I.5.(4)5.0.	Q 0.90 hy 0.40 or 2.78 mt 1.39 ab 16.77 an 77.01 C 0.82	Statue of Khephren, Near Assuan, Egypt.	J. Couyat.	J. Couyat, B. Soc. Fr. Min., XXXI, p. 340, 1908.	Anorthosite.	
8	I.5.5.0.⊙	or 0.56 di 2.07 ab 10.48 ol 0.34 an 85.35 mt 0.23 ne 0.28	New Caledonia.	Boiteau.	A. La Croix, C. R., CLII, p. 819, 1911.	Anorthosite.	

ORDER 6. IENDOFELIC. RUSSARE. (C. I. P. W., 1902.)

SUBRANG 3. SODIPOTASSIC. BEEMEROSE. (C. I. P. W., 1902.)

1	I.6.1(2).3.	or 56.15 ol 0.86 ab 3.67 mt 3.24 an 6.12 ne 27.55 C 1.33	Beemersville, Sussex County, New Jersey.	L. G. Eakins.	J. P. Iddings, U. S. G. S. B. 150, p. 211, 1898.	Nephelite syenite.	In W. T., p. 207.
2	I(II).6.1''3.	or 49.48 di 3.24 ab 13.86 wo 1.04 an 5.28 mt 3.02 ne 21.16 il 0.91 hm 0.64 ap 0.67	Kruger Mountain, Okanagan Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 453, 1912.	Nephelite syenite.	
3	I(II).6''1.3.	or 49.48 di 5.45 ab 8.12 wo 0.81 an 2.22 mt 2.78 ne 27.12 il 0.15 cc 1.80 ap 0.34	Diamond Joe Quarry, Magnet Cove, Arkansas.	H. S. Wash- ington.	H. S. Washington, J. G., IX, p. 611, 1901.	Foyaite.	In W. T., p. 207.
4	I.(5)6.1.3(4).	or 65.05 di 4.34 ab 12.05 mt 2.55 an 1.39 ne 13.63	Picota, Serra de Monchique, Portugal.	A. Zilliagus.	Kraatz-Koschlau and Hackmann, T. M. P. M., XVI, p. 252, 1896.	Leucite- tinguaite vitrophyre.	In W. T., p. 207.
5	I(II).6.1''3.	or 62.27 di 2.59 ab 3.67 wo 3.02 an 4.73 mt 1.16 ne 19.32 il 1.52 th 0.28 hm 1.44	Poggio Muratella, Lake Bracciano, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 47, 1906.	Leucite phonolite.	Incomplete in J. G., V, p. 49, 1897. In W. T., p. 207.
6	I(II).6.1''3.	or 54.49 di 7.98 ab 2.36 wo 0.46 an 5.28 mt 1.16 ne 25.98 il 0.46 hl 0.82	Eruption of 79, Pompeii, Vesuvius.	Pisani.	A. Lacroix, N. Arch. Mus. (4), IX, p. 129, 1907.	Leucite phonolite pumice.	
7	I''.(5)6.1.3(4).	or 40.59 di 2.81 ab 37.20 wo 1.39 an 1.39 mt 1.39 ne 11.36 il 1.22 hm 0.96	Near Castel Ferru, Monte Ferru, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXIX, p. 520, 1915.	Phonolite.	
8	I''.'6.1''3(4).	or 38.36 ol 7.28 ab 31.44 mt 0.46 an 3.61 il 0.91 ne 13.63 C 2.65	Tscheremschanka River, Ilmen Mountains, Russia.	Z. Weyberg.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Miascite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. MIASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9	58.72	21.50	1.78	n. d.	0.75	1.72	7.10	7.48	0.68		0.19			Cl trace	99.92	
A4. IV	.979	.211	.011	(.022)	.019	.030	.115	.080			.002					
10	55.38	23.74	0.63	1.26	0.81	0.67	5.29	10.05	1.12	0.38	trace	0.06	trace	CO ₂ 0.05 ZrO ₂ 0.06 Cl trace SO ₂ 0.07 BaO trace	99.57	
A2. II	.923	.233	.004	.018	.020	.012	.085	.107								
11	56.26	21.19	0.75	1.37	1.87	0.49	5.86	11.42	n. d.		0.15		0.06	CO ₂ 0.24 NaCl 0.09 F 0.25	100.00	
A2. II	.938	.208	.005	.019	.047	.009	.095	.121			.002		.001			
12	58.00	22.52	1.37	1.01	0.85	0.90	6.93	7.72	1.71		0.19				101.20	
B3. IV	.967	.221	.009	.014	.021	.016	.111	.082			.002					

RANG 1. PERALKALIC. MIASKASE.

1	56.31	20.11	3.93	1.45	0.36	0.62	8.76	4.65	1.13		2.82	0.13	0.60	ZrO ₂ in TiO ₂ Cl 0.15	101.02	2.67
A2. II	.939	.197	.024	.020	.009	.011	.141	.050			.035	.001	.008			
2	59.68	23.48	0.59	0.37	0.21	0.26	9.52	4.68	0.66		none	none	none	CO ₂ 0.04	99.49	
A2. II	.995	.230	.004	.005	.005	.005	.153	.050								
3	58.30	21.38	1.05	2.04	0.22	0.95	8.66	6.06	0.45	0.35	0.10	0.04	trace	CO ₂ none ZrO ₂ 0.02 SO ₂ 0.08 Cl 0.35 BaO none	100.05	
A1. I	.972	.210	.007	.029	.006	.017	.140	.065			.001					
4	58.77	22.53	1.54	1.04	0.19	0.74	9.62	4.89	0.90	0.07	0.31		trace	ZrO ₂ 0.11 BaO none	100.71	2.596
A2. II	.980	.220	.010	.014	.005	.013	.155	.052			.004					
5	56.75	20.69	3.52	0.59	0.11	0.37	11.45	2.90	3.18	0.04	0.30		trace	SO ₂ trace Cl 0.28 BaO none	100.18	2.474
A2. II	.946	.203	.022	.008	.003	.007	.185	.031			.004					
6	54.22	20.20	2.35	1.02	0.29	0.70	9.44	4.85	5.57	0.42	0.38	0.11	0.19	CO ₂ trace SO ₂ none BaO trace	99.74	
A2. II	.904	.198	.015	.014	.007	.012	.152	.052			.005	.001	.003			
7	54.77	21.41	2.46	0.68	0.18	0.47	9.53	4.97	4.61	0.17	0.08	0.07	0.68	CO ₂ 0.03	100.11	
A2. II	.913	.210	.015	.010	.005	.008	.153	.053			.001		.010			
8	53.57	22.46	1.01	0.92	0.37	1.49	10.22	5.14	2.97	0.43	0.20	0.11	0.56	CO ₂ 0.95 S 0.17	100.57	
A2. II	.893	.220	.006	.013	.009	.027	.165	.054			.003	.001	.008			
9	54.79	22.87	1.74	3.24	1.92	trace	10.75	4.06	n. d.				trace	ZrO ₂ 0.07 Cl 0.54 F 0.08	99.75	
A3. III	.913	.224	.011	.045	.048		.174	.043								
10	58.60	20.98	2.22	0.44	0.33	1.13	8.38	5.49	1.92						99.69	
A3. III	.977	.205	.014	.006	.008	.020	.135	.059								
11	57.86	20.26	2.35	0.39	0.04	0.89	9.47	5.19	2.40	0.21	0.22	0.03	0.21	CO ₂ none ZrO ₂ 0.15 SO ₂ 0.06 Cl 0.08 S 0.03 BaO 0.09 SrO 0.04	99.97	
A1. I	.964	.199	.015	.005	.001	.016	.153	.055			.003		.003			

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 3. SODIPOPASSIC. BEEMEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	I.6.1.3''.	or 44.48 di 3.25 ab 25.68 ol 2.16 an 4.45 il 0.80 ne 18.74	Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 19, 1902.	Ditroite.	
10	I.6.1.3.⊙.	or 59.49 ol 2.83 ab 9.43 mt 0.93 an 3.34 ne 19.03 C 2.96	Near Itschan, East Cape, Siberia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XIII, p. 176, 1901.	Nephelite syenite.	
11	I(II).6(7).1.''3.	or 58.38 ac 2.31 le 6.98 ns 0.37 ne 24.71 di 2.04 hl 0.09 ol 4.60 il 0.30	Zerafshan, Turkestan.	Not stated.	J. Preobrajensky, Ann. Inst. Pet. Grt., XV, p. 316, 1911.	Sodalite syenite.	
12	I.''6.1''3''.	or 45.59 ol 1.78 ab 27.25 mt 2.09 an 4.45 il 0.30 ne 16.76 C 1.22	Maros Peak, Celebes.	Hinden.	C. Schmidt, in Sarasin, Ins. Celebes, IV, p. 18, 1901.	Phonolite.	

SUBRANG 4. DOSODIC. MIAKOSKE. (C. I. P. W., 1902.)

1	I''6.1.4.	or 27.80 il 4.26 ab 44.64 hm 3.34 an 1.67 pl 0.27 ne 15.90 ru 0.40 ap 0.34	Naujakasik, Ilmausak Region, Green- land.	C. Detlefsen.	N. V. Ussing, G. Julhb., p. 132, 1911.	Foyaite.	
2	I.''6.1.(3)4.	or 27.80 ol 0.45 ab 49.25 mt 0.93 an 1.39 ne 16.76 C 2.24	Blue Mountain, Methuen Town- ship, Renfrew County, Ontario.	N. N. Evans.	Adams and Barlow, Can. G. S. Mem. 6, p. 295, 1910.	Nephelite syenite.	Also in Tr. R. Sec. Can., II, (4), p. 52, 1909.
3	I.6.1.''4.	or 36.14 di 1.67 ab 35.11 ol 2.19 an 2.78 mt 1.62 ne 19.31 il 1.15 hl 0.59	Red Hill, New Hampshire.	H. S. Washing- ton.	Pirsson and Washing- ton, A. J. S., XXIII, p. 273, 1907.	Nephelite syenite.	In W. T., p. 207.
4	I.6.1.4.⊙.	or 28.91 ol 0.35 ab 42.97 mt 2.32 an 3.61 il 0.61 ne 20.73	Salem Neck, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VI, p. 803, 1898.	Foyaite.	In W. T., p. 207.
5	I(II).6.1.4(5).	or 17.24 ac 6.01 ab 46.64 di 0.65 ne 23.57 wo 0.46 mt 0.93 il 0.61 hm 0.80	Pickards Point, Manchester, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, A. J. S., VI, p. 185, 1898.	Analcite tinguaite.	Also in J. G., VII, p. 120, 1899. In W. T., p. 207.
6	I''6.1.4.	or 28.91 ac 2.77 ab 33.54 di 2.26 ne 23.28 mt 2.09 il 0.76 ap 0.34	Southboro, Massachusetts.	H. N. Stokes.	U. S. G. S. B. 148, p. 77, 1897.	Phonolite (tinguaite).	Cf. H. S. Wash- ington, J. G., VII, p. 121, 1899. In W. T., p. 207.
7	I.6.1.4.⊙.	or 29.47 di 0.92 ab 35.63 ol 0.41 an 1.11 mt 3.48 ne 24.14 il 0.15	Mount Solon, Augusta County, Virginia.	J. W. Watson.	Watson and Cline, B. G. S. A., XXIV, p. 316, 1913.	Nephelite. syenite.	
8	I''6(7).1.4.	or 30.02 di 4.92 ab 25.15 wo 0.35 an 0.28 mt 1.39 ne 33.23 il 0.46 ap 0.34	Mount Solon, Augusta County, Virginia.	J. G. Dinwid- die.	Watson and Cline, B. G. S. A., XXIV, p. 316, 1913.	Nephelite syenite.	
9	I(II).6''1.4.	or 23.91 ol 6.83 ab 36.94 mt 2.55 ne 28.26 hl 0.94 C 1.53	Near Wausau, Wisconsin.	W. W. Daniells.	S. Weidman, J. G., XII, p. 552, 1904.	Sodalite- nephelite syenite.	
10	I.''6.1.4.	or 32.80 di 1.73 ab 41.40 wo 0.12 an 3.06 mt 1.39 ne 15.90 hm 1.28	Black Hills, South Dakota.	H. N. Stokes.	W. Cross, U. S. G. S. B. 148, p. 114, 1897.	Phonolite.	Same as next below, No. 11. In W. T., p. 209.
11	I''6.1.4.	or 30.58 ac 4.16 ab 38.51 di 0.22 ne 20.02 wo 1.74 mt 0.70 il 0.46 hm 0.48	Black Hills, South Dakota.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 150, p. 193, 1898.	Phonolite.	Same as next above, No. 10. In W. T., p. 209.

CLASS I. PERSALANE—Continued.

RANG I. PERALKALIC. MIASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
12	58.70	19.26	3.37	0.58	0.76	1.41	8.55	4.53	2.57	0.07	trace	0.10	0.10		100.00	
A3. III	.978	.189	.021	.008	.019	.025	.138	.048			—	.001	.001			
13	59.13	22.20	2.04	0.33	none	0.58	10.20	4.35	1.23	0.37	0.07	0.05	0.05	CO ₂ none ZrO ₂ 0.02 F 0.20 S none V ₂ O ₅ none BaO none SrO none	100.82	2.639
A1. I	.986	.218	.013	.005	—	.010	.165	.047			.001	—	—			
14	60.02	20.98	2.21	0.51	trace	1.18	8.83	5.72	0.70			trace	trace	Cl trace	100.15	2.576
A3. III	1.000	.206	.014	.007	—	.021	.142	.061				—	—			13°
15	59.38	19.47	1.60	1.19	0.36	1.96	7.80	5.83	0.69	0.11	0.58	0.08	0.15	ZrO ₂ 0.10 SO ₃ 0.37 Cl 0.22 BaO 0.13 SrO 0.03 Li ₂ O trace	100.05	
A1. I	.990	.191	.010	.017	.009	.035	.126	.062			.007	—	.002			
16	59.00	20.07	1.58	0.65	0.10	1.05	8.34	5.63	2.03	0.24	0.29	0.05	0.12	CO ₂ 0.26 ZrO ₂ 0.20 SO ₃ 0.07 Cl 0.24 BaO trace SrO none Li ₂ O trace	99.92	
A1. I	.983	.197	.010	.009	.003	.019	.134	.060			.004	—	.002			
17	58.98	20.54	1.65	0.48	0.11	0.67	9.95	5.31	0.97	0.19	0.24	0.04	0.26	ZrO ₂ 0.20 SO ₃ 0.20 Cl 0.28 BaO none SrO none Li ₂ O trace	100.07	
A1. I	.983	.201	.010	.007	.003	.012	.161	.056			.003	—	.004			
18	58.78	20.03	1.87	0.49	0.16	0.83	9.36	5.50	1.57	0.31	0.29	0.03	0.15	ZrO ₂ 0.17 SO ₃ 0.12 Cl 0.58 BaO none SrO none Li ₂ O trace	100.24	
A1. I	.980	.196	.012	.007	.004	.014	.151	.059			.004	—	.002			
19	58.64	19.62	2.17	0.42	0.37	1.24	8.39	5.26	2.40	0.34	0.20	0.03	0.20	CO ₂ 0.23 ZrO ₂ 0.09 Cl 0.14 BaO trace SrO trace Li ₂ O trace	99.74	2.52
A1. I	.977	.192	.014	.006	.009	.022	.135	.056			.003	—	.003			
20	58.99	19.01	1.74	0.59	0.27	2.02	9.11	5.07	1.24	0.38	0.21	0.04	0.08	CO ₂ none ZrO ₂ 0.07 SO ₃ 0.96 Cl 0.15 BaO 0.02 SrO 0.02 Li ₂ O trace	99.97	
A1. I	.983	.185	.011	.008	.007	.036	.147	.054			.003	—	.001			
21	56.24	21.43	2.01	0.55	0.15	1.38	10.53	5.74	0.86	0.12	0.26	0.06	0.08	ZrO ₂ 0.09 SO ₃ 0.10 Cl 0.12 F trace S 0.03 Cr ₂ O ₃ none NiO none BaO 0.08 SrO 0.03 Li ₂ O trace	99.86	2.619
A1. I	.937	.210	.013	.008	.004	.025	.170	.061			.003	—	.001			22°
22	52.83	20.70	2.84	1.19	0.41	1.00	9.94	4.87	5.13	0.37	0.16	0.03	trace	CO ₂ 0.15 SO ₃ trace Cl 0.06	99.68	
A2. II	.880	.203	.018	.017	.010	.018	.160	.052			.002	—	—			
23	54.92	20.81	1.28	1.36	0.37	0.95	8.95	7.26	1.34		0.43	trace	none	CO ₂ 0.12 SO ₃ 0.07 Cl 1.28	99.65	2.581
A2. II	.915	.204	.008	.019	.009	.017	.145	.078			.005	—	—			
24	56.43	22.25	2.66	0.97	trace	1.35	11.12	2.77	2.05			trace	trace		99.66	2.54
A3. III	.941	.218	.017	.014	—	.025	.179	.030				—	—			

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 4. DOSODIC. MIAKOSKE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
12	I''(5)6.1.4.	or 26.69 di 4.10 ab 48.47 mt 2.09 an 0.83 hm 1.92 ne 12.92 ap 0.34	Shields River, Crazy Mountains, Montana.	W. H. Melville.	Wolff and Tarr, B. Mus. Comp. Zool., XVI, p. 232, 1893.	Acmite trachyte.	In W. T., p. 209.
13	I.6.1.4.⊙.	or 26.13 wo 0.46 ab 46.89 mt 0.93 an 1.67 il 0.15 ne 21.44 hm 1.44	Near Libby, Montana.	G. Steiger.	E. S. Larsen, U. S. G. S. ec. lab.	Nephelite syenite.	
14	I.6.1.4.⊙.	or 33.92 wo 2.09 ab 42.70 mt 1.62 an 0.83 hm 1.12 ne 17.18	Bet. Florissant and Manitou, El Paso County, Colorado.	L. G. Eakins.	W. Cross, Pr. Colo. Sc. Soc., II, p. 169, 1887.	Phonolite.	Also in U. S. G. S. A. R. 16, p. 39, 1895. In W. T., p. 209.
15	I''(5)6.1.''4.	or 34.47 di 2.44 ab 42.44 wo 1.51 an 3.06 mt 2.32 ne 10.51 il 1.06 hl 0.35 th 0.71	Bull Cliff, Cripple Creek, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 16, p. 43, 1895.	Phonolite.	In W. T., p. 209.
16	I.(5)6.1.''4.	or 33.36 di 0.65 ab 43.75 wo 1.04 an 1.95 mt 1.62 ne 13.20 il 0.61 hl 0.35 hm 0.48 th 0.14	Big Bull Mountain, Cripple Creek, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 16, p. 39, 1895.	Phonolite.	In W. T., p. 209.
17	I''6.1.4.	or 31.14 ac 4.16 ab 39.30 di 2.64 ne 19.88 il 0.46 hl 0.47 th 0.43	Mitre Peak, Cripple Creek, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 16, p. 39, 1895.	Phonolite.	In W. T., p. 209.
18	I.6.1.4.⊙.	or 32.80 ac 1.85 ab 41.65 di 0.86 ne 16.33 wo 1.16 hl 0.94 mt 1.16 th 0.28 il 0.61 hm 0.48	Straub Mountain, Cripple Creek, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 16, p. 39, 1895.	Phonolite.	In W. T., p. 209.
19	I''6.1.4.	or 31.14 di 1.94 ab 44.54 wo 1.39 an 0.28 mt 1.39 ne 14.20 il 0.46 hl 0.23 hm 0.28	Rhyolite Mountain, Cripple Creek, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 16, p. 39, 1895.	Phonolite.	In W. T., p. 209.
20	I''6.1.4.	or 30.02 ac 0.92 ab 45.32 di 1.51 ne 12.64 wo 3.36 hl 0.23 mt 1.39 th 1.70 il 0.46 hm 0.48	Mount Waas, La Sal Mountains, Utah.	W. F. Hille- brand.	L. M. Prindle, U. S. G. S. B. 228, p. 191, 1904.	Noselite syenite porphyry.	
21	I(II).6''1.4.	or 33.92 ac 6.01 ab 23.58 ns 0.93 ne 29.54 di 2.10 wo 1.86 il 0.46	Pleasant Valley, Colfax County, New Mexico.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 171, 1900.	Phonolite.	In W. T., p. 211.
22	I(II).6(7).1.4.	or 28.91 ac 4.16 ab 25.68 di 3.65 ne 28.97 wo 0.26 mt 2.09 il 0.30	San José, Tamaulipas, Mexico.	H. S. Washing- ton.	G. I. Finlay, Ann. N. Y. Ac. Sci., XIV, p. 281, 1903.	Tinguaite.	Also in J. F. Kemp, Tr. Am. Inst. M. Eng., 1905, p. 894. In W. T., p. 211.
23	I.6.1.''4.	or 43.37 di 2.51 ab 22.53 ol 0.34 an 1.67 mt 1.86 ne 21.87 il 0.76 hl 2.11 th 0.99	Cabo Frio, Rio Janeiro, Brazil.	F. E. Wright.	F. E. Wright, T. M. P. M., XX, p. 288, 1901.	Nephelite aplite.	
24	I.6.1.4(5).	or 16.68 wo 1.86 ab 48.21 mt 3.25 an 2.50 hm 0.48 ne 24.71	Wolf Rock, n. Lands End, Cornwall.	Phillips.	Cited in J. J. H. Teall, Brit. Petrol., p. 368, 1888.	Phonolite.	Not in W. T.

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. MIASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
25	59.52	21.24	2.71	0.48	0.12	0.48	10.72	3.92	0.50		trace		trace	CO ₂ 0.21 ZrO ₂ 0.16	100.06	
A3. III	.992	.208	.017	.007	.003	.009	.173	.041			—		—			
26	56.67	22.42	1.82	0.80	1.33	0.28	8.52	7.32	1.18		0.24	0.01	trace	Cl trace	100.59	
A2. II	.945	.220	.011	.011	.033	.005	.137	.078			.003	—	—			
27	53.96	21.78	0.62	2.55	0.54	1.93	8.61	7.02	2.29		1.03	trace	0.15	Cl trace S trace SrO trace Li ₂ O trace	100.48	2.578
A2. II	.899	.214	.004	.036	.014	.034	.139	.074			.013	—	.002			18.5°
28	56.44	20.52	2.72	4.51	0.28	1.23	9.01	4.80	0.75	0.12	0.12	0.10	0.06	Cl 0.06 S 0.07	100.49	
A2. II	.941	.201	.017	.063	.007	.022	.145	.051			.002	.001	—			
29	52.04	23.92	1.46	4.18	1.50	2.38	8.36	2.37	2.21		0.26	0.26	0.11	CO ₂ 0.58	99.63	
A2. II	.867	.234	.009	.058	.038	.043	.135	.025			.003	.002	.002			
30	56.40	21.36	2.96	2.39	0.90	1.81	8.57	4.83	0.01		0.84		0.49		100.56	
A2. II	.940	.209	.018	.033	.023	.032	.138	.051			.010		.007			
31	52.24	20.46	3.82	0.68	0.14	2.39	10.05	6.18	1.84		0.32	0.05	0.09	CO ₂ 1.69 ZrO ₂ trace S trace NiO 0.06 BaO 0.06 SrO 0.09	100.15	
A1. I	.871	.201	.024	.009	.004	.043	.162	.066			.004	—	.001			
32	56.43	20.58	2.88	1.28	0.28	1.45	8.62	4.23	2.90			0.06	0.66	SO ₃ 0.22 Cl 0.07 F trace	99.58	2.499
A2. II	.941	.202	.018	.018	.007	.026	.139	.045				—	.009			
33	55.92	20.35	2.16	0.94	0.62	2.21	8.35	4.83	3.51		trace	0.18	0.50	SO ₃ 0.23 Cl 0.06 F trace Ce ₂ O ₃ trace Cu 0.18	100.04	2.452
A1. I	.932	.200	.014	.013	.016	.039	.135	.052			—	.001	.007			
34	55.01	21.67	1.95	1.86	0.13	2.12	9.78	3.54	2.17		0.27	0.08	0.22	SO ₃ 0.41 Cl 0.08 F trace Ce ₂ O ₃ trace Cu 0.12	99.41	2.513
B1. II	.917	.213	.012	.026	.003	.038	.158	.037			.003	—	.003			
35	55.79	19.53	2.07	2.13	0.40	3.68	7.39	5.01	2.72		none	0.11	0.51	CO ₂ 0.43 SO ₃ none Cl 0.12	99.89	2.529
A2. II	.930	.191	.013	.029	.010	.066	.119	.053			—	.001	.007			
36	55.46	24.49	2.63	1.06	0.05	0.92	9.78	5.16	0.07		0.20	trace	trace		99.82	
A3. III	.924	.240	.016	.015	.001	.016	.158	.056			.003	—	—			
37	55.31	21.74	1.77	1.02	0.47	1.57	8.77	6.49	1.94		0.07		trace	CO ₂ 0.11 Cl 0.60	99.86	
A3. III	.922	.213	.011	.014	.012	.029	.142	.069			.001		—			
38	53.19	22.57	1.98	1.72	0.49	2.55	8.86	6.60	1.47		trace	trace		CO ₂ 0.11 Cl 0.37	99.91	
A3. III	.887	.221	.013	.024	.012	.046	.143	.070			—	—				
39	56.10	22.90	0.47	1.49	0.26	1.73	8.50	7.10	0.99		trace	trace		Cl 0.58	100.32	
A3. III	.935	.225	.003	.021	.007	.030	.137	.076			—	—				

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBBRANG 4. DOSODIC. MIASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
25	I.6.1.4.⊙.	or 22.80 ac 2.77 ab 49.25 di 0.65 ne 20.73 wo 0.70 Z 0.18 mt 1.62 hm 0.64	Cevedaes, Alemtejo, Portugal.	M. Dittrich.	A. Osann, N. J., 1907, II, p. 123.	Aegirite- nephelite gneiss.	
26	I.6.1.(3)4.	or 43.37 ol 2.31 ab 23.06 mt 1.86 an 1.39 il 0.46 ne 26.41 hm 0.48	Between Monchique and Caldas, Serra de Monchique, Portugal.	O. Heidenreich.	Kraatz-Koschlaw and Hackmann, T. M. P. M., XVI, p. 228, 1896.	Nephelite syenite.	In W. T., p. 211.
27	I(II).6(7).1.''4.	or 41.14 di 7.77 ab 14.15 ol 0.17 an 0.28 mt 0.93 ne 31.81 il 1.98	Picota, Serra de Monchique, Portugal.	P. Jannasch.	P. Jannasch, N. J., 1884, II, p. 13.	Nephelite syenite.	In W. T., p. 211.
28	I(II).6.1.4.	or 28.36 di 3.41 ab 37.73 ol 3.61 an 1.39 mt 3.94 ne 20.73 il 0.50 ap 0.54	Lilla Ellringe, Almunge, Sweden.	N. Sahlbom.	P. Quensel, B. G. Inst. Un. Ups., XII, p. 190 (1913), 1914.	Canadite gneiss.	
29	I(II).''6.1(2).4''.	or 13.90 ol 7.28 ab 47.16 mt 2.99 an 6.12 il 0.46 ne 12.78 ap 0.67 cc 1.40 C 5.30	Upptorp, Almunge, Sweden.	N. Sahlbom.	P. Quensel, B. G. Inst. Ups., XII, p. 185, 1914.	Nephelite syenite.	Marginal facies of No. 19, II, 6.2.4.
30	I''.6.1(2).4.	or 28.36 di 2.72 ab 37.20 ol 1.87 an 5.56 mt 4.18 ne 19.03 il 1.52	Poutelitschorr, Kola Peninsula, Finland.	F. Eichleiter.	F. Eichleiter, Vh. Wien. G. R.-A., XXVII, p. 218, 1893.	Nephelite syenite.	Cf. V. Hack- mann, Fennia, XI, No. 2, p. 139, 1894. In W. T., p. 211.
31	I''.6.1.4.	or 36.70 di 0.86 ab 22.27 wo 3.13 an 3.34 mt 1.39 ne 22.86 il 0.61 nc 4.11 hm 2.88	Pyhakuru, Kuolajarvi, Finland.	I. G. Sundell.	I. G. Sundell, B. C. G., Fin. No. 16, p. 5, 1905.	Cancrinite syenite.	
32	I''.''6.1''4.	or 25.02 di 1.86 ab 44.01 ol 0.72 an 5.00 mt 4.18 ne 15.62	Magdeburg, Hegau.	G. F. Föhr.	G. F. Föhr, In. Diss. Wurz., p. 32, 1883.	Phonolite.	In W. T., p. 211.
33	I''.6.1.4.	or 28.91 di 4.94 ab 36.65 wo 0.12 an 3.61 mt 3.25 ne 13.46 ap 0.34	Staufen, Hegau.	G. F. Föhr.	G. F. Föhr, In. Diss. Wurz., p. 28, 1883.	Phonolite.	In W. T., p. 211.
34	I''.6.1(2).4.	or 20.57 di 3.62 ab 40.35 ol 1.62 an 6.39 mt 2.78 ne 21.58 il 0.46 th 0.71	Hohentwiel, Hegau.	J. F. Föhr.	G. F. Föhr, In. Diss. Wurz., p. 8, 1883.	Phonolite.	In W. T., p. 213.
35	I(II).''6.1(2).4.	or 29.47 di 7.87 ab 34.06 wo 1.28 an 5.28 mt 3.02 ne 15.34 ap 0.34	Donnersberg, Bohemia.	F. Hanusch.	J. E. Hibsich, T. M. P. M., XXIV, p. 287, 1905.	Phonolite.	
36	I.6.1''4.	or 31.14 ol 0.07 ab 31.44 mt 2.78 an 4.45 il 0.46 ne 27.83 hm 0.64 C 1.02	Gy. Szt. Miklos, Czanod, Sieben- bürgen, Hungary.	J. v. Szadec- zky.	J. v. Szadeczky, Ref. N. J., 1901, I, p. 402.	Tinguaite.	In W. T., p. 213.
37	I''.6.1.''4.	or 38.36 di 3.09 ab 24.63 wo 0.58 an 2.78 mt 2.55 ne 24.71 il 0.15 hl 0.94	Monte Mulatto, Predazzo, Tyrol.	M. Dittrich.	J. Romberg, Sb. Pr. Ak. Wiss., 1902, I, p. 748.	Tinguaite.	
38	I(II).6(7).1.''4.	or 38.92 di 5.32 ab 14.15 wo 1.16 an 3.61 mt 3.02 ne 31.52 hl 0.59	Val dei Coccoletti, Monte Mulatto, Predazzo, Tyrol.	M. Dittrich.	J. Romberg, Sb. Pr. Ak. Wiss., 1902, I, p. 748.	Nephelite syenite porphyry.	
39	I.6.1''.(3)4.	or 42.26 di 2.42 ab 22.79 ol 1.30 an 5.56 mt 0.70 ne 24.28 hl 0.94	Pollena Ravine, Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4), IX, p. 141, 1907.	Phonolite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. MIAKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
40	56.10	22.65	0.59	1.48	0.62	2.27	8.27	7.09	0.10		0.07	trace		Cl 0.50	99.74	
A2. II	.935	.223	.004	.021	.016	0.41	.134	.076			.001	—				
41	54.35	22.90	0.75	1.50	0.14	1.66	9.34	6.94	1.00		0.13			Cl 1.13	99.84	
A2. II	.906	.225	.005	.021	.003	.030	.151	.073			.002					
42	59.46	19.49	1.45	2.30	1.05	1.66	9.34	4.34	0.26	0.21	0.45		0.24	Cl 0.38	100.63	
A2. II	.991	.191	.009	.032	.026	.030	.151	.046			.006		.003			
43	57.46	22.34	2.10	2.16	0.46	0.91	9.84	4.48	0.42			0.17		Cl 0.06	100.40	
A3. III	.958	.219	.013	.030	.012	.016	.159	.048				.002				
44	57.25	22.33	1.39	1.97	0.38	1.16	9.85	5.88	0.32			0.04			100.57	
A3. III	.954	.219	.009	.028	.010	.021	.159	.063				—				
45	56.10	21.80	2.26	0.87	0.83	0.88	9.85	4.35	1.66		0.21		0.58	ZrO ₂ 0.31 Cl 0.45	100.15	
A2. II	.935	.214	.014	.012	.021	.016	.159	.047			.003		.008			
46	55.65	20.30	1.28	1.73	0.54	2.15	9.93	6.03	1.00			0.10		SO ₃ 0.85 Cl 0.79	100.35	
A2. II	.928	.199	.008	.024	.014	.039	.160	.064				.001				
47	55.55	23.70	2.27	1.73	0.93	0.86	9.43	4.44	1.04		0.26	trace	0.66		100.85	
A2. II	.926	.232	.014	.024	.023	.015	.152	.047			.003		.009			
48	55.54	21.81	1.56	2.15	0.52	1.38	8.32	4.73	2.97			0.06		Cl 0.50	99.54	
A3. III	.926	.214	.010	.030	.013	.025	.134	.050				—				
49	57.7	20.1	1.0	2.2	0.2	1.2	10.6	5.4	1.3		0.2			Cl 0.4	100.3	
B3. IV	.962	.197	.006	.031	.005	.021	.171	.057			.003					
50	54.52	22.00	1.69	1.20	0.26	0.91	9.38	6.29	2.55	1.16	0.23	trace	0.20	Cl 0.71	101.10	
B2. III	.909	.216	.011	.017	.007	.016	.152	.067			.003	—	.003			
51	58.62	21.50	0.47	3.65	0.88	0.56	7.95	5.47	1.12		0.06			Cl none	100.28	
A3. III	.977	.211	.003	.051	.022	.010	.128	.058			.001					
52	58.61	21.80	1.76	1.77	0.62	0.30	9.45	5.21	0.75					Cl trace	100.27	
A3. III	.977	.214	.011	.025	.016	.005	.153	.055								
53	58.25	21.00	0.48	3.22	0.99	1.60	8.01	5.86	0.62		0.06			Cl trace	100.09	
A3. III	.971	.206	.003	.044	.025	.029	.129	.063			.001					
54	58.10	21.10	2.36	1.77	0.73	0.66	7.81	5.51	1.75		0.06			Cl none	99.85	
A3. III	.968	.207	.015	.025	.018	.012	.126	.059			.001					
55	54.97	21.27	2.25	1.02	0.33	1.65	8.87	6.15	2.44	0.31	0.35	0.14			99.78	
A2. II	.913	.209	.014	.014	.008	.030	.144	.066			.004	.001				

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 4. DOSODIC. MIAKOSSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
40	I.6.1''.(3)4.	or 42.26 di 4.89 ab 17.82 ol 0.93 an 5.56 mt 0.93 ne 26.41 il 0.15 hl 0.82	Pollena Ravine, Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4), IX, p. 141, 1907.	Phonolite.	
41	I.6''.1''.4''.	or 40.59 di 3.16 ab 17.82 ol 0.38 an 4.73 mt 1.16 ne 29.82 il 0.30 hl 1.87	Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4), IX, p. 143, 1907.	Sodalitic sanidine.	
42	I(II).6.1.4.	or 25.58 ac 0.46 ab 46.11 di 6.90 ne 16.19 ol 1.45 hl 0.59 mt 1.86 il 0.91	Pico de Teyde, Teneriffe, Canary Islands.	N. Sahlbom.	H. Preiswerk, N. J. Ch., 1909, p. 396.	Sodalite trachyte.	Also in Vh. Nf. Ges. Basel, XXI, p. 213, 1910.
43	I.6.1.4.⊙.	or 26.69 ol 2.57 ab 41.92 mt 3.02 an 2.50 ap 0.67 ne 22.44 C 0.31	Fotaba, Tamara Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, Nouv. Arch. Mus., III, 1911, p. 65.	Syenite.	
44	I''.6''.1.4.	or 35.03 ac 1.39 ab 26.98 di 4.99 ne 29.68 ol 0.72 mt 2.09	Topsail Point, Tamara Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, Nouv. Arch. Mus., III, p. 73, 1911.	Nephelite aplite.	
45	I.6.1.4.⊙.	or 26.13 di 0.43 ab 39.82 ol 1.64 an 3.89 mt 3.25 ne 21.87 il 0.46 hl 0.70	Rouma, Los Islands, French Guinea.	Pisani.	A. Lacroix, Nouv. Arch. Mus., III, p. 38, 1911.	Nephelite syenite.	
46	I(II).6.1.4.	or 35.58 ac 1.39 ab 25.15 di 7.74 ne 24.71 wo 0.35 hl 1.29 mt 1.16 th 1.56 ap 0.34	Tamara, Los Islands, French Guinea.	Lassieur.	A. Lacroix, Nouv. Arch. Mus., III, p. 65, 1911.	Hauyne, syenite.	
47	I.6.1.4.⊙.	or 26.13 ol 3.24 ab 37.99 mt 3.25 an 4.17 il 0.46 ne 22.58 C 1.84	Kassa Island, Los Islands, French Guinea.	Pisani.	A. Lacroix, Nouv. Arch. Mus., III, p. 105, 1911.	Nephelite aplite.	
48	I''.6.1(2).4.	or 27.80 ol 2.73 ab 39.82 mt 2.32 an 6.95 ne 14.48 hl 0.82 C 1.22	Topsail Point, Tamara Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, Nouv. Arch. Mus., III, p. 73, 1911.	Tinguaite.	
49	I(II).6.1.4.	or 31.69 ac 2.77 ab 32.49 ns 2.32 ne 22.15 di 5.12 hl 0.70 ol 1.16 il 0.46	Gebel Abu Khrug, Egypt.	J. Couyat.	J. Couyat, C. R., CLI, p. 1140, 1910.	Microsyenite.	
50	I.6.1''.4.	or 37.25 di 2.14 ab 24.89 mt 2.55 an 1.95 il 0.46 ne 26.84 hl 1.17	Near Kadero, Kordofan.	D. Schrimpf.	G. Linck, N. J. B. B., XVII, p. 442, 1903.	Tinguaite.	
51	I''.(5)6.1''.4.	or 32.25 ol 6.44 ab 41.66 mt 0.70 an 2.78 il 0.15 ne 13.77 C 1.53	Nosy Komba, Madagascar.	Pisani	A. Lacroix, Mat. Min. Mad., I, p. 53, 1902.	Phonolite.	
52	I.6.1.4.⊙.	or 30.58 ol 2.55 ab 41.39 mt 2.55 an 1.39 ne 21.02	Ampangarinana, Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 47, 1902.	Foyaite.	
53	I''.6.1''.4.	or 35.03 di 3.56 ab 33.01 ol 4.46 an 3.89 mt 0.70 ne 18.74 il 0.15	Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 53, 1902.	Microfoyaite.	
54	I.(5)6.1''.4.	or 32.80 ol 2.28 ab 42.44 mt 3.48 an 3.34 il 0.15 ne 12.78 C 1.02	Mount Antana- omby, Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 19, 1902.	Ditroite.	
55	I''.6.1''.4.	or 36.70 ac 0.46 ab 25.15 di 1.73 ne 26.98 wo 2.20 mt 2.32 il 0.61 hm 0.48 ap 0.34	Andrakaka, Madagascar.	Boiteau.	A. Lacroix, pers. com., 1913.	Tinguaite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. MIASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
56	54.15	21.95	2.07	1.74	0.82	2.55	8.29	6.10	0.30	1.00	0.66	0.16			99.79	
A2. II	.903	.215	.013	.024	.021	.046	.134	.065			.008	.001				
57	53.40	23.50	1.57	2.35	0.66	2.64	9.10	5.58	1.25		0.33				99.31	
B3. IV	.890	.230	.010	.033	.017	.047	.147	.060			.004					
58	53.20	22.60	1.81	2.46	0.38	3.22	9.05	5.16	3.00		0.32				100.38	
A3. III	.887	.221	.011	.034	.010	.057	.146	.055			.004					
59	52.60	22.80	2.43	2.00	1.09	1.67	9.42	5.21	2.12		0.26				99.60	
A3. III	.877	.223	.015	.028	.027	.030	.152	.055			.003					
60	56.12	19.62	2.32	0.90	0.13	2.07	9.50	4.17	3.50		0.46			CO ₂ 0.80	99.50	
A3. III	.935	.192	.014	.013	.003	.038	.153	.045			.006					
61	49.88	21.70	1.30	0.53	0.07	3.92	11.80	4.66	2.35			trace		CO ₂ 2.30 Cl 0.44 F 1.25	100.20	
A2. II	.831	.213	.008	.007	.002	.070	.190	.050				—				
62	58.31	24.81	n. d.	0.73	0.16	0.64	11.52	3.25	0.87						100.29	
A4. IV	.972	.243	—	.010	.004	.012	.185	.035								
63	57.82	20.87	0.89	1.54	none	1.13	10.18	4.71	0.95		0.27		0.79	CO ₂ 0.08 F 0.49	99.72	
A2. II	.964	.205	.006	.021	—	.020	.165	.050			.003		.011			
64	57.32	21.90	0.71	2.12	none	1.14	10.05	5.06	1.00		0.02		0.48	CO ₂ 0.14 F 0.12	100.06	
A2. II	.955	.215	.004	.029	—	.020	.162	.054			—		.007			
65	59.49	19.56	2.20	2.34	0.09	0.85	8.68	5.29	1.36	0.18	0.09	0.04	trace	CO ₂ 0.04 ZrO ₂ 0.11 SO ₃ none Cl 0.08 Cr ₂ O ₃ none NiO trace BaO trace SrO trace V ₂ O ₅ none CuO trace	100.40	2.593
A1. I	.993	.192	.014	.032	.002	.015	.140	.056			.001	—	—			
66	55.15	20.66	1.90	3.06	0.36	1.58	8.10	5.41	3.25	0.25	0.06	0.16	trace	CO ₂ 0.09 ZrO ₂ trace SO ₃ none Cl 0.08 Cr ₂ O ₃ none V ₂ O ₅ none NiO 0.03 BaO none SrO trace	100.14	2.573
A1. I	.919	.202	.012	.043	.009	.029	.131	.057			—	.001	—			
67	53.62	22.78	2.62	0.72	0.42	0.68	10.40	5.22	2.44	0.22	0.08	0.03	0.05	CO ₂ 0.07 ZrO ₂ 0.20 SO ₃ 0.05 Cl 0.19 F trace Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO none SrO trace	99.79	2.577
A1. I	.894	.224	.016	.010	.011	.012	.168	.055			.001	—	—			
68	53.30	22.19	3.58	1.55	0.24	1.36	9.73	5.74	1.38	0.38	none	0.08	0.47	CO ₂ 0.02 ZrO ₂ 0.11 SO ₃ 0.09 Cl 0.12 F 0.02 Cr ₂ O ₃ none V ₂ O ₅ none NiO 0.04 BaO none SrO trace Li ₂ O trace	100.41	2.618
A1. I	.888	.218	.023	.022	.006	.024	.156	.061			—	—	.007			

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 4. DOSODIC. MIASKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
56	I(II).6.1''.4.	or 36.14 di 5.28 ab 21.22 wo 0.35 an 4.45 mt 3.02 ne 26.55 il 1.22 ap 0.34	Ankify, Madagascar.	Boiteau.	A. Lacroix, pers. com., 1913.	Phonolite.	
57	I''.6(7).1(2).4.	or 33.36 di 5.56 ab 17.54 ol 1.06 an 6.39 mt 2.32 ne 32.09 il 0.61	Bezavona Moun- tain, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 205, 1903.	Tinguaite.	Border of dike.
58	I(II).6(7).1''.4.	or 30.58 di 6.87 ab 20.96 wo 0.93 an 5.56 mt 2.55 ne 30.10 il 0.61	Bezavona Moun- tain, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 205, 1903.	Tinguaite.	Center of dike.
59	I''.6(7).1''.4.	or 30.58 di 3.06 ab 22.53 ol 1.80 an 4.45 mt 3.48 ne 30.96 il 0.46	Antshanina, Bezavona, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 205, 1903.	Variolitic tinguaite.	"Spherulitic" in reference.
60	I(II).6.1.4.	or 25.02 ac 2.77 ab 40.08 di 0.65 ne 20.02 wo 4.06 mt 1.62 il 0.91 hm 0.16	Leeuwfontein, Pretoria, Transvaal.	Pisani.	H. A. Brouwer, Transv. Neph., p. 63, 1910.	Foyaite.	Fresh?
61	I.6''.1(2).4.	or 27.80 di 0.43 ab 25.68 wo 0.46 an 8.62 mt 1.62 ne 23.57 hm 0.16 hl 0.70 ft 2.57 ne 5.52	Olivenfontein, Pilandsberg, Transvaal.	Pisani.	H. A. Brouwer, Transv. Neph., p. 163, 1910.	Nephelite syenite porphyry.	
62	I.6.1.4''.	or 19.46 ol 1.30 ab 47.16 an 3.34 ne 26.98 C 1.12	Zerafshan, Turkestan.	Not stated.	J. Preobrajensky, Ann. Inst. Pet. Gr., XV, p. 320, 1911.	Nephelite syenite.	
63	I(II).6.1.4.	or 27.80 ac 2.77 ab 36.68 ns 0.49 ne 24.14 di 4.96 ol 0.92 il 0.46	Nizhnaya Podgo- lenaya River, Jenissei District, Siberia.	A. Nikitinsky.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 292, 1910.	Nephelite syenite.	
64	I''.6.1.4.	or 30.02 ac 0.46 ab 33.01 di 6.20 ne 27.83 ol 0.82 mt 0.70	Nizhnaya Podgo- lenaya River, Jenissei District, Siberia.	A. Nikitinsky.	A. Meister, Expl. G. Reg. Aurif. Sib., IX, p. 292, 1910.	Nephelite syenite.	
65	I''.6.1.4.	or 31.14 ac 1.85 ab 43.75 di 3.66 ne 14.91 ol 0.82 mt 2.32 il 0.15	Dilabamble, Dubbo, New South Wales.	H. P. White.	G. W. Card, Rec. G. S. N. S. W., VIII, (3), p. 260, 1907.	Phonolite.	
66	I''.6.1''.4.	or 31.69 di 2.69 ab 32.49 ol 2.08 an 3.89 mt 2.78 ne 19.60 il 0.15 ap 0.34	Dairy Mount, New South Wales.	W. A. Greig.	Dep. Min. N. S. W. A. R. (1906), p. 177, 1907.	"Rock" (phono- lite?).	
67	I.6(7).1.4.	or 30.58 di 2.38 ab 26.72 mt 2.09 an 0.28 il 0.15 ne 33.23 hm 1.12	Porcupine Moun- tain, Barigan, New South Wales.	J. C. H. Min- gay.	G. W. Card, pers. com.	Tinguaite.	
68	I(II).6(7).1.4.	or 33.92 di 2.78 ab 22.53 wo 1.28 an 0.28 mt 5.34 ne 32.09	Jimmy Jimmy, Barigan, New South Wales.	J. C. H. Min- gay.	G. W. Card, pers. com.	Tinguaite.	

CLASS I. PERSALANE—Continued.

RANG 1. PERALKALIC. MIASKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
69	56.40	21.41	1.04	1.50	0.51	0.96	9.61	5.36	2.50		0.25			Cl trace	99.54	
A3. III	.940	.210	.007	.021	.013	.017	.155	.057			.003					
70	53.87	20.64	4.51	1.42	0.34	2.13	6.86	6.24	2.93		1.10	0.18	trace		100.22	
A2. II	.898	.202	.028	.019	.009	.038	.111	.066			.014	.001	—			
71	58.64	22.55	0.97	0.99	0.16	1.43	9.87	4.98	0.35	0.08	0.28	trace	trace		100.30	
A3. III	.977	.222	.006	.014	.004	.025	.160	.053			.004	—	—			
72	57.95	20.43	3.43	1.35	0.26	1.90	8.32	5.96	0.39	0.23	0.40	0.07	0.07		100.76	
A2. II	.966	.200	.021	.019	.007	.034	.134	.064			.005	—	.001			

RANG 2. DOMALKALIC. VIEZZENASE. (C. I. P. W., 1902.)

1	53.76	23.21	1.27	3.18	0.23	2.94	6.97	7.01	1.71		none	trace	none	Cl 0.02 SrO 0.04 Li ₂ O trace	100.34	
A2. II	.896	.227	.008	.044	.006	.052	.113	.074			—	—	—			
2	53.13	24.87	2.25	1.40	trace	2.68	5.56	7.26	1.05	0.36	0.60				99.16	
B3. IV	.886	.244	.014	.019	—	.048	.090	.078			.008					
3	55.95	19.80	0.97	1.98	1.20	2.66	5.58	8.32	1.00		1.60	0.30		SO ₃ 0.65 Cl 0.16	100.17	
A2. II	.933	.194	.006	.028	.030	.047	.090	.088			.020	.002			(100.16)	
4	52.60	26.60	0.91	2.21	0.51	1.89	7.06	6.94	0.61					CO ₂ 0.55	99.88	
A3. III	.877	.261	.006	.031	.013	.034	.114	.073								
5	56.31	21.69	1.20	0.97	0.54	1.88	5.56	9.17	1.13	none	0.41	0.13	0.16	ZrO ₂ none Cl 0.28 F 0.03 S 0.17 BaO 0.05 SrO 0.04	99.72	
A1. I	.939	.213	.008	.014	.014	.034	.090	.098			.005	.001	.002			

RANG 2. DOMALKALIC. VIEZZENASE.

1	54.68	21.63	2.22	2.00	1.25	2.86	7.03	4.58	1.88	0.27	0.79	0.28	trace	CO ₂ none SO ₃ 0.07 Cl none F 0.22 BaO 0.05	99.81	
A1. I	.911	.212	.014	.028	.031	.051	.113	.049			.010	.002	—			
2	54.76	24.72	2.73	2.35	0.10	1.67	10.38	2.37	0.55						99.63	
A3. III	.913	.242	.017	.033	.003	.030	.168	.026								
3	58.40	20.25	1.78	2.41	0.49	3.11	7.01	5.39	0.57	0.27	0.25	0.20	trace	CO ₂ none ZrO ₂ none SO ₃ 0.06 Cl 0.02 BaO trace	100.21	
A1. I	.973	.198	.011	.033	.012	.055	.113	.057			.003	.001	—			
4	55.93	21.83	3.62	0.34	0.61	2.54	7.84	6.01	0.72		0.42	0.22		CO ₂ 0.03 SO ₃ 0.08 Cl 0.51	100.70	2.62
A2. II	.932	.214	.023	.005	.015	.045	.126	.064			.005	.002				
5	54.71	22.07	2.49	2.50	0.88	2.52	7.53	5.46	1.13	0.20				Cl trace	99.54	
A3. III	.912	.216	.016	.035	.022	.045	.122	.059								

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 6. DOSODIC. MIAKOSKE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
69	I''6.1.4.	or 31.69 ac 0.92 ab 31.96 di 3.96 ne 26.13 ol 0.76 mt 1.16 il 0.46	Papenoo Valley, Tahiti.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 107, 1910.	Tinguaite.	
70	I(II)''6.1(2).(3)4	or 36.70 di 2.06 ab 27.77 mt 1.16 an 6.95 il 2.13 ne 16.47 hm 3.68 ap 0.34	Howe Island, Kerguelen Island.	Green and Steele.	E. G. Hogg, Pr. R. Soc. Vict., XI (II), p. 210, 1899.	Phonolite.	Not in W. T.
71	I.6.1.4.⊙	or 29.47 di 1.86 ab 38.77 wo 0.93 an 2.50 mt 1.39 ne 24.42 il 0.61	Brown Island, South Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 115, 1907.	Phonolitic trachyte.	
72	I(II).6.1.''4.	or 35.58 di 1.51 ab 35.63 wo 2.90 an 0.56 mt 3.48 ne 18.74 il 0.76 hm 0.96	Cape Crozier, Ross Island, South Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 115, 1907.	Trachy- dolerite.	

SUBRANG 3. SODIPOTASSIC.

1	I''6.''2.3(4).	or 41.14 di 2.91 ab 14.14 ol 2.93 an 11.12 mt 1.86 ne 24.42	The Ridge, Magnet Cove, Arkansas.	J. F. Williams.	J. F. Williams, Ark. G. S. A. R. II, p. 266, (1890) 1891.	Tinguaite porphyry.	In W. T., p. 213.
2	I''6.2.3.	or 43.37 mt 2.55 ab 18.60 ol 1.22 an 13.34 hm 0.48 ne 15.48 C 3.88	Cnoc-na-Sroine, Assynt, Scotland.	A. Gemmell.	A. Gemmell, Tr. Edin. G. Soc., IX (5), p. 418, 1910.	Nephelite syenite.	Al ₂ O ₃ high? MgO low?
3	I''(5)6.(1)2.3.	or 44.48 di 3.06 ab 24.63 ol 1.29 an 7.23 mt 1.39 ne 11.64 il 3.04 hl 0.23 ap 0.67 th 1.14	Kassa, Los Islands, French Guinea.	Pisani.	A. Lacroix, Nouv. Arch. Mus., III, p. 66, 1911.	Micromon- zonite.	
4	I.6.(1)2.3(4).	or 40.59 ol 3.46 ab 16.24 mt 1.39 an 9.45 ne 23.57 C 4.08	Karakut, Vizagapatam District, Madras, India.	T. L. Walker.	T. L. Walker, Rec. G. S. Ind., XXXVI, p. 21, 1908.	Nephelite syenite.	
5	I''6.(1)2.3.	or 54.49 di 0.43 ab 14.15 ol 1.15 an 8.06 mt 1.86 ne 16.76 il 0.76 hl 0.47 ap 0.34	Gentungen River, n. Biliangin, Maros District, Celebes.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 627, 1913.	Nephelite syenite.	Also in Iddings and Morley, J. G., XXIII, p. 240, 1915.

SUBRANG 4. DOSODIC. VIEZZENOSE. (C. I. P. W., 1902.)

1	I.(5)6.2.4.	or 27.24 ol 2.58 ab 37.20 mt 3.25 an 12.23 il 1.52 ne 11.93 ap 0.67 C 0.61	Brookville, New Jersey.	G. Steiger.	F. L. Ransome, A. J. S., VIII, p. 423, 1899.	Nephelite syenite.	In W. T., p. 213.
2	I.6.(1)2.4(5).	or 14.48 ol 1.84 ab 46.11 mt 3.94 an 8.34 ne 22.72 C 1.84	Wausau, Wisconsin.	W. W. Daniells.	S. Weidman, J. G., XII, p. 552, 1904.	Nephelite syenite.	
3	I(II).(5)6.(1)2.''4	or 31.69 di 5.66 ab 38.25 ol 0.62 an 7.78 mt 2.55 ne 11.36 il 0.46 ap 0.34	San José, Tamaulipas, Mexico.	H. S. Washing- ton.	G. I. Finlay, Ann. N. Y. Ac. Sc., XIV, p. 266, 1903.	Nephelite syenite.	In W. T., p. 211.
4	I''6.(1)2.''4.	or 35.58 di 1.51 ab 30.13 ol 0.56 an 8.62 il 0.76 ne 17.46 hm 3.62 hl 0.82 ap 0.67	Forodada, Columbretes Islands, Spain.	R. Pfohl.	F. Becke, T. M. P. M., XVI, p. 165, 1896.	Phonolite.	In W. T., p. 211.
5	I''6.(1)2.''4.	or 32.80 di 2.75 ab 27.24 ol 2.45 an 9.17 mt 3.71 ne 19.88	Barranco do Banho, Serra de Mon- chique, Portugal.	A. Kalecsinzy.	A. Kalecsinzy, F. K., XV, p. 562, 1885.	Nephelite syenite.	Cf. A. Merian, N. J. B. B., III, p. 271, 1885. In W. T., p. 213.

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. VIEZZENASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
6	56.04	22.15	1.06	3.28	1.12	2.42	8.39	5.03	0.67						100.16	
A3. III	.934	.217	.007	.046	.028	.043	.135	.054								
7	51.90	22.54	4.03	3.15	1.97	3.11	8.18	4.72	0.22						99.82	
A3. III	.865	.220	.025	.044	.049	.056	.114	.050								
8	52.04	23.92	1.46	4.18	1.50	2.38	8.36	2.37	2.21		0.26	0.26	0.11	CO ₂ 0.58	99.63	
A2. II	.864	.234	.009	.058	.038	.043	.135	.025			.003	.002	.002			
9	54.46	19.96	2.34	3.33	0.61	2.12	8.68	2.76	5.20		trace		trace		99.46	
A3. III	.908	.196	.015	.046	.015	.038	.140	.030			—		—			
10	55.19	23.02	1.23	n. d.	trace	2.70	9.95	4.48	0.52		0.63			CO ₂ none SO ₃ 2.70	100.42	
A4. IV	.920	.225	.017	(.034)	—	.048	.160	.048			.008					
11	54.65	22.75	3.40	2.18	2.04	2.19	6.61	5.25	0.76		1.09				100.92	2.575
B3. IV	.911	.223	.021	.030	.051	.039	.106	.056			.014					
12	56.13	23.01	1.06	n. d.	1.88	1.98	8.67	3.57	2.22		0.81	0.03	0.18	CO ₂ trace ZrO ₂ 0.02 SO ₃ 0.05 Cl 0.12 Ce ₂ O ₃ 0.03	99.56	
A2. II	.936	.225	.007	(.014)	.047	.036	.140	.038			.010	—	.003			
13	53.99	20.65	2.98	1.69	0.83	5.00	5.84	5.21	4.17			0.18			100.44	
A3. III	.900	.202	.019	.024	.021	.089	.094	.055				.001				
14	53.7	23.0	1.9	1.3	0.3	2.9	8.4	5.8	2.0	0.2	trace			Cl 0.4	99.90	2.577
B3. IV	.895	.225	.012	.018	.008	.052	.135	.062			—					
15	56.88	22.60	0.97	2.19	0.56	1.33	8.30	5.57	0.98		0.29	0.08		ZrO ₂ trace Cl 0.34	100.09	
A2. II	.948	.221	.006	.031	.014	.023	.134	.060			.004	—				
16	56.54	22.33	1.43	1.18	0.75	1.94	8.39	5.20	0.62		0.30	trace		Cl 0.87	99.55	
B2. III	.942	.219	.009	.017	.019	.035	.135	.055			.004	—				
17	55.99	20.18	4.19	3.25	0.33	2.29	6.85	5.59	0.43	0.10	0.29	0.19		SO ₃ 0.02 Cl 0.04	99.84	
A2. II	.933	.198	.026	.045	.008	.041	.111	.060			.004	.001				
18	55.95	22.96	0.86	1.10	0.25	1.71	7.17	6.43	2.55	0.35	0.33	0.10			99.76	
A2. II	.933	.225	.005	.015	.006	.030	.116	.068			.004	.001				
19	54.25	22.61	0.61	3.60	0.26	1.62	8.95	3.97	3.12		0.32				99.31	
B3. IV	.904	.221	.004	.050	.007	.029	.145	.043			.004					
20	53.12	21.62	3.46	1.94	1.10	2.00	8.16	5.11	2.56		0.08	0.46	trace	ZrO ₂ 0.06 SO ₃ 0.23	99.95	2.540
A2. II	.885	.215	.022	.027	.028	.036	.132	.054			.001	.003	—			
21	55.95	22.53	0.99	4.54	trace	3.21	7.42	3.97	none	0.09	0.98			CO ₂ 0.02	99.70	
A3. III	.933	.220	.006	.063	—	.057	.119	.042			.012					

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 4. DOSODIC. VIEZZENOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
6	I(II).6.(1)2.4.	or 30.02 di 3.53 ab 29.87 ol 4.60 an 7.78 mt 1.62 ne 22.15	Vasvik Tunnel, Laurvik, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 38, 1890.	Nephelite rhomben porphyry.	In W. T., p. 213.
7	I(II).6.2.4.	or 27.80 ol 5.37 ab 25.15 mt 5.80 an 15.57 ne 18.74	Lunde, Lougendal, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 33, 1890.	Larudalite.	In W. T., p. 299.
8	I(II).''6.''2.4''.	or 13.90 hy 7.56 ab 42.97 mt 2.09 an 10.01 il 0.46 ne 15.05 ap 0.67 C 3.88	Upptorp, Almunge, Sweden.	N. Sahlbom.	P. Quensel, B. G. Inst. Un. Ups., XII, p. 185, 1913.	Nephelite syenite.	
9	I(II).''6.(1)2.4''.	or 16.68 di 2.85 ab 46.64 ol 3.05 an 7.23 mt 3.48 ne 14.48	Njurjwarpachk, Umptek, Kola.	K. Kjellin.	V. Hackmann, Fennia, XI, No. 2, p. 158, 1894.	(Analcite) tinguaite.	In W. T., p. 215.
10	I.6.2.4.⊙	or 26.69 ol 2.65 ab 35.63 il 1.22 an 13.34 ne 15.34 th 4.83 C 0.31	Laacher See, Rheinland.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn., XLVIII, p. 317, 1891.	Nosean sanidinite.	In W. T., p. 215.
11	I(II).(5)6.2.(3)4.	or 31.14 ol 3.57 ab 34.06 mt 3.71 an 10.84 il 2.13 ne 11.64 hm 0.80 C 2.24	Schackau, Rhöngebirge.	H. Gachot.	H. Gachot, In. Diss. Stras., p. 15, 1912.	Trachypho- nolite.	
12	I.''6.''2.4.	or 21.13 ol 4.00 ab 42.97 il 1.52 an 10.01 ne 16.47 C 1.12	Spitzberg, Brück, Bohemia.	H. Trenkler.	H. Trenkler, T. M. P. M., XX, p. 148, 1901.	Phonolite.	Traces of Cu, Pb, Sn, Sb, As.
13	I(II).(5)6.2.(3)4.	or 30.58 di 5.78 ab 28.30 wo 0.81 an 14.73 mt 4.41 ne 11.36 ap 0.34	Kahle Berg, Böhmischer Mittelgebirge.	C. F. Eich- leiter.	G. Irgang, T. M. P. M., XXVIII, p. 64, 1909.	Phonolite.	
14	I.''6.(1)2.''4.	or 34.47 di 3.22 ab 29.70 wo 1.04 an 8.06 mt 2.78 ne 27.12	Monte Mulatto, Predazzo, Tyrol.	C. Hlawatsch.	C. Hlawatsch, T. M. P. M., XX, p. 48, 1901.	Nephelite syenite porphyry.	
15	I.6.2.4.⊙	or 33.36 ol 3.12 ab 33.54 mt 1.39 an 6.39 il 0.61 ne 18.46 hl 0.59 C 0.92	Kassa, Los Islands, French Guinea.	Lassieur.	A. Lacroix, Nouv. Arch. Mus., III, p. 42, 1911.	Aegirite syenite.	
16	I.''6.(1)2.4.	or 30.58 ol 1.74 ab 37.20 mt 2.09 an 9.73 il 0.67 ne 14.77 hl 1.40 C 0.61	Tahiré, Rouma Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, Nouv. Arch. Mus., III, p. 86, 1911.	Theralite.	Border of dike. Cf. No. 23, III.6.2.4.
17	I(II).''6.(1)2.(3)4.	or 33.36 di 2.60 ab 35.11 ol 1.10 an 7.51 mt 6.03 ne 12.50 il 0.61 ap 0.34	Makarainga, Madagascar.	Boiteau.	A. Lacroix, C. R., CLV, p. 1126, 1912.	Nephelite syenite gneiss.	
18	I.''6.(1)2.(3)4.	or 37.81 ol 1.03 ab 30.39 mt 1.16 an 7.51 il 0.61 ne 16.47 ap 0.34 C 1.43	Nosy Komba, Madagascar.	Boiteau(?).	A. Lacroix, pers. com., 1913.	Nephelite syenite.	
19	I.''6.(1)2.4.	or 23.91 ol 4.77 ab 35.89 mt 0.93 an 8.06 il 0.61 ne 21.72 C 0.41	Bezavona Moun- tains, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 205, 1903.	Leucitic microsyen- ite.	
20	I.''6.(1)2.4.	or 30.02 ol 2.47 ab 29.34 mt 5.10 an 8.06 il 0.15 ne 21.58 ap 1.01	Kibo, Kilimanjaro, German East Africa.	K. Eyme.	L. Finckh, Ros. Fests., p. 392, 1906.	Nephelite rhomben porphyry.	ZrO ₂ =TiO ₂ ?
21	I.''6.(5)6.2.4.	or 23.35 ol 4.59 ab 40.35 mt 1.39 an 15.85 il 1.82 ne 11.93 C 0.20	Mount Erebus, S. Victoria Land, Antarctica.	Burrows and Walkom.	T. W. E. David, pers. com.	Kenytte pumice.	

CLASS I. PERSALANE—Continued.

RANG 2. DOMALKALIC. VIEZZENASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	55.45	21.65	0.81	0.49	0.13	3.65	9.31	1.62	1.64		0.30	0.01	0.01	CO ₂ 0.88 Corundum 4.45	100.40	
A2. II	.924	.212	.005	.007	.003	.065	.150	.017			.004	—	—			

CLASS I. PERSALANE.

RANG 1. PERALKALIC. LAUGENASE. (C. I. P. W., 1902.)

1	53.54	24.27	1.11	1.24	0.08	0.71	8.62	8.87	1.09	0.14				CO ₂ 0.20	99.87	
A3. III	.892	.238	.007	.017	.002	.012	.139	.094								
2	50.25	21.41	1.76	1.82	0.31	4.48	5.16	11.32	0.62	0.34	0.57	0.12		CO ₂ 0.32 ZrO ₂ 0.02 SO ₃ 1.05 Cl 0.12 BaO 0.13 SrO trace	99.86	
A1. I	.938	.210	.011	.025	.008	.080	.084	.120			.007	.001				

RANG 1. PERALKALIC. LAUGENASE.

1	48.38	30.54	0.40	0.06	0.19	1.87	13.94	3.70	0.50		trace	trace	trace	CO ₂ 0.62 CuO trace	100.20	
A3. III	.806	.299	.003	.001	.005	.034	.225	.039			—	—	—			
2	49.42	22.99	2.70	1.89	0.45	2.59	9.63	4.21	5.73						99.61	
A3. III	.824	.225	.017	.026	.011	.046	.155	.045							(99.99)	
3	55.50	22.45	1.03	1.32	0.47	1.60	10.74	5.48	0.96		0.50	trace			100.05	
A3. III	.925	.220	.006	.018	.012	.029	.173	.059			.006	—				
4	50.99	24.66	2.33	2.21	1.54	2.13	11.36	4.39	0.63						100.24	
A3. III	.850	.242	.015	.031	.039	.038	.185	.047								
5	56.75	21.10	2.55	none	0.08	0.76	11.66	3.88	1.69		0.03	0.01	0.12	ZrO ₂ 1.60 Cl 0.04 S 0.03	100.30	
A1. I	.946	.207	.016	—	.002	.014	.188	.041			—	—	.002			

RANG 1. PERALKALIC. LAUGENASE.

1	48.10	24.20	1.11	2.47	0.51	0.45	15.20	3.00	1.20		0.13		0.48	ZrO ₂ trace Cl 2.80	99.65	
B2. II	.802	.237	.007	.035	.013	.008	.245	.032			.002		.007			

CLASS I. PERSALANE.

RANG 1. PERALKALIC. HOCHELAGASE. (H. S. WASHINGTON, 1917.)

1	41.84	28.42	3.29	0.40	0.25	0.66	19.48	2.06	0.62	0.14	none	0.04	0.15	Cl 4.47	101.82 1.10	
A2. II	.697	.278	.021	.006	.006	.012	.315	.022			—	—	.002		100.72	

RANG 2. DOMALKALIC. MONMOUTHASE. (ADAMS AND BARLOW, 1908.)

1	39.74	30.59	0.44	2.19	0.60	5.75	13.25	3.88	1.00		0.13		0.03	CO ₂ 2.17 SO ₃ trace Cl 0.02 S 0.07	99.86	
A2. II	.662	.300	.003	.031	.015	.103	.214	.041			.002		—			

ORDER 6. LENDOFELIC. RUSSARE—Continued.

SUBRANG 5. PERSODIC. RAGLANOSE. (ADAMS AND BARLOW, 1908.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I.(5)6.2.(4)5.	or 9.45 ol 0.21 ab 56.53 mt 0.70 an 12.51 il 0.61 ne 12.07 hm 0.32 C 4.45 cc 2.00	Raglan Township, Renfrew County, Ontario.	M. F. Connor.	Adams and Barlow, Tr. R. Soc. Can., II (4), p. 61, 1909.	Raglanite.	Also in Can. G. S., Mem. 6, p. 314, 1910.

ORDER 7. LENFELIC. TASMANARE. (C. I. P. W., 1902.)

SUBRANG 3. SODIPOTASSIC. APPIANOSE. (H. S. WASHINGTON, 1906.)

1	I.(6)7.1.3(4).	or 52.26 di 1.67 ab 3.14 ol 0.72 an 1.39 mt 1.62 ne 37.77	Magnet Cove, Arkansas.	H. S. Washing- ton.	H. S. Washington, J. G., IX, p. 667, 1901.	Foyaite.	In W. T., p. 215.
2	I(II).7''.1(2).''3.	or 30.02 di 3.46 ab 6.12 wo 4.64 lc 28.78 mt 2.55 ne 19.31 il 1.06 hl 0.35 ap 0.34 th 1.85	Tavolato, Via Appia, n. Rome, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 51, 1906.	Tavolatite, (haunne- leucite tephrite).	

SUBRANG 4. DOSODIC. LAUGENOSE. (C. I. P. W., 1902.)

1	I.7(8).1''.4(5).	or 21.68 ol 0.35 ab 10.48 mt 0.23 an 5.56 hm 0.32 ne 58.22 ce 1.40 C 1.53	Craigmont, Renfrew County, Ontario.	M. F. Connor.	Adams and Barlow, Tr. R. Soc. Can., II (4), p. 60, 1909.	Craigmontite (corundum nephelite syenite).	Also in Can. G. S., Mem. 6, p. 312, 1910.
2	I''.(6)7.1(2).4.	or 25.02 di 4.61 ab 19.91 wo 0.12 an 6.95 mt 3.94 ne 33.23	San José, Tamaulipas, Mexico.	G. I. Finlay.	G. I. Finlay. Ann. N. Y. Ac. Sc., XIV, p. 285, 1904.	Analcite tinguaite.	Also in Tr. Am. Inst. M. E., 1905, p. 894.
3	I(II).(6)7.1.4.	or 32.80 ac 2.77 ab 21.74 ns 0.73 ne 33.94 di 5.56 wo 0.58 il 0.91	Brathagen, Laugendal, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 41, 1890.	Foyaite.	In W. T., p. 215.
4	I(II).7.1.4.	or 26.13 di 6.69 ab 14.15 ol 2.15 an 2.78 mt 3.48 ne 44.87	Laugendal, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 41, 1890.	Nephelite porphyry.	In W. T., p. 215.
5	I(II).7''.1.4.	or 22.80 ac 7.39 ab 35.11 ns 0.73 ne 28.12 di 0.43 Z 2.38 wo 1.39	Kaxtorp, Lake Vetter, Sweden.	R. Mauzelius.	A. E. Törnebohm, Afh. Sv. G. Und., No. 199, p. 11, 1906.	Catapleite syenite.	

SUBRANG 5. PERSODIC.

1	I''.7.1.(4)5.	or 17.79 di 1.92 ab 21.48 ol 3.52 ne 46.58 mt 1.62 hl 4.68 il 0.30	Rouma Island, Los Islands, French Guinea.	Pisani.	A. Lacroix, Nouv. Arch. Mus., III, p. 38, 1911.	Sodalite nephelite syenite.	
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ORDER 8. FELDOLINIC. ONTARARE. (C. I. P. W., 1902.)

SUBRANG 4. DOSODIC. HOCHELAGOSE. (H. S. WASHINGTON, 1917.)

1	I.8.1.4(5).	or 12.23 di 1.30 ab 5.34 wo 0.23 an 1.11 mt 1.86 ne 68.73 hm 2.08 hl 7.37	Beloeil Mountain, Rouville County, Quebec.	M. F. Connor.	J. J. O'Neill, Can. G. S. Mem. 43, p. 48, 1914.	Tawite.	
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SUBRANG 4. DOMALKALIC. MONMOUTHOSE. (ADAMS AND BARLOW, 1908.)

1	I.8''.(1)2.4''.	an 12.51 ol 3.70 lc 7.85 cs 0.86 ne 60.78 mt 0.70 kp 7.27 il 0.30 (c.c.4.90)	Monmouth Town- ship, Renfrew County, Ontario.	M. F. Connor.	Adams and Barlow, A. J. S., XVII, p. 275, 1904.	Monmouthite.	Also in Can. G. S. Mem. 6, p. 276, 1910.
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CLASS I. PERSALANE.

RANG 1. PERALKALIC. CONGRESSASE. (F. D. ADAMS, 1913.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	41.58	30.36	2.46	1.64	0.37	0.88	14.30	5.15	0.95	0.06	0.22	0.07	0.03	CO ₂ 0.80 Cl 0.30 FeS ₂ 0.36 BaO 0.02 SrO trace	99.55	
AL I	.693	.298	.015	.023	.009	.016	.231	.055			.003	—	—			

RANG 1. PERALKALIC. CONGRESSASE.

1	36.64	32.41	none	trace	none	0.19	18.67	0.41	n. d.					NaCl 11.83	100.15	
B3. IV	.611	.318	—	—	—	.004	.302	.004							(100.29)	

CLASS I. PERSALANE. SECTION I. C EXTREME OVER Z.

RANG. NOT NEEDED.

1	75.54	18.65	0.35	0.06	none	0.03	none	none	3.67	1.10	0.48	trace		ZrO ₂ 0.06 FeS ₂ 0.10	100.04	
A2. II	1.259	.183	.002	.001	—	—	—	—			.006	—				

SECTION 1. C EXTREME OVER Z.

RANG 1. PERALKALIC.

1	69.42	15.65	1.25	3.30	1.02	0.63	0.27	4.06	0.54	0.06	trace	0.40	0.39	F 3.36 B ₂ O ₃ 0.59 Li ₂ O 0.81		
AL I	1.157	.153	.008	.046	.026	.011	.004	.043			—	.003	.006			

RANG 1. PERALKALIC.

1	57.18	34.10	0.54	0.28	0.10	0.63	0.39	2.57	2.02	0.69	0.66	0.53	none	CO ₂ none ZrO ₂ 0.02 FeS ₂ 0.28 BaO 0.04 SrO trace Li ₂ O none	100.03	
AL I	.953	.334	.003	.004	.003	.011	.006	.028			.008	.004				

SECTION 1. C EXTREME OVER Z.

RANG 1. PERALKALIC. URALASE. (H. S. WASHINGTON, 1903.)

1	40.53	13.62	0.19	0.04	none	0.67	3.40	5.92	1.01					Corundum 34.62	100.00	
A3. III	.676	.134	.001	.001	—	.012	.055	.063								
2	52.34	16.05	0.45	n. d.	0.16	0.20	4.77	6.58	0.40					Corundum 18.55	99.50	
A4. IV	.872	.157	.003	(.006)	.004	.004	.077	.070								
3	40.06	13.65	0.35	n. d.	0.15	0.30	3.71	5.20	0.46					Corundum 35.40	99.28	
A4. IV	.668	.134	.002	(.004)	.004	.005	.060	.055								

RANG 3. ALKALICALCIC. DUNGANNONASE. (ADAMS AND BARLOW, 1908.)

1	49.56	33.70	0.93	1.42	0.97	5.89	4.95	1.23	0.84					CO ₂ 0.17	99.66	
A3. III	.826	.330	.006	.019	.024	.105	.080	.013								

ORDER 9. PERLENIC. LAURENTARE. (F. D. ADAMS, 1913.)

SUBRANG 4. DOSODIC. CONGRESSOSE. (F. D. ADAMS, 1913.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I.9.1.4⊙	or 3.89 ol 1.14 lc 20.93 mt 3.48 ne 64.18 il 0.46 hl 0.47 pr 0.36 C 1.73	Congress Hill, Craigmont, Ontario.	M. F. Connor.	Adams and Barlow, XII Cong. G. Int., Guide No. 2, p. 96, 1913.	Congressite.	

SUBRANG 5. PERSODIC.

1	I.9.1.5⊙	an 1.11 kp 1.26 ne 85.77 hl 11.83 C 0.82	Zerafshan, Turkestan.	Not stated.	J. Preobrajensky, Ann. Inst. Pet. Gr., XV, p. 310, 1911.	Sodalite syenite.	Norm not exact, insufficient SiO ₂ .
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SUBCLASS II. Q+F+L DOMINANT OVER C+Z. ORDER 1. PERQUARIC.

SUBRANG. NOT NEEDED.

1	I. II. 1.1.	Q 75.54 il 0.15 C 18.85 hm 0.30 ru 0.40	Dehesa, San Diego County, California.	W. T. Schaller.	W. T. Schaller, U. S. G. S. B. 262, p. 96, 1905.	Quartz - du- mortierite rock.	Igneous?
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ORDER 2. DOQUARIC.

SUBRANG 1. PERPOTASSIC.

1	I. II. 2'' 1.1.	Q 48.54 hy 7.62 or 23.91 mt 1.86 ab 2.10 ap 1.01 an 0.28 C 10.71	St. Michaels Mount, Lands End, Cornwall.	W. Pollard.	Reid and Flett, G. S. Eng., Mem., sh. 351, p. 59, 1907.	Greisen.	
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SUBRANG 2. DOPOTASSIC.

1	I. II. 2.1.2.	Q 44.94 il 0.61 or 15.57 hm 0.54 ab 3.14 ru 0.32 C 30.60 ap 1.34	Washongae River, Skamania County, Washington.	W. T. Schaller.	W. T. Schaller, U. S. G. S. B. 262, p. 105, 1905.	Dumortier- ite-quartz rock.	Igneous?
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ORDER 5. PERFELIC. INDARE. (H. S. WASHINGTON, 1903.)

SUBRANG 3. SODIPOTASSIC. URALOSE. (H. S. WASHINGTON, 1903.)

1	I. II (III). 5.1'' 3.	or 35.03 mt 0.23 ab 21.48 an 3.34 ne 3.98 C 35.03	Craigmont, Renfrew County, Ontario.	M. F. Connor.	Adams and Barlow, Tr. R. Soc. Can., II, (4), p. 71, 1909.	Corundum syenite pegmatite.	
2	I. II. 5.1.3.⊙	or 38.92 ol 0.89 ab 37.20 an 1.11 ne 1.70 C 19.36	Nikolskaja Ssopka, Ural Mountains, Russia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XVIII, p. 219, 1898.	Corundum syenite.	In W. T., p. 219.
3	I. II (III). 5.1.3.	or 30.58 ol 0.69 ab 27.25 an 1.39 ne 2.27 C 36.83	Ilmen Mountains, Ural Mountains, Russia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XVIII, p. 219, 1898.	Corundum pegmatite.	In W. T., p. 219.

SUBRANG 4. DOSODIC. DUNGANNONOSE. (ADAMS AND BARLOW, 1908.)

1	I. (I) II. 5.3.4(5).	Q 1.74 hy 4.12 or 7.23 mt 1.39 ab 41.92 oo 0.39 an 28.08 C 13.87	Dungannon, Renfrew County, Ontario.	N. N. Evans.	Adams and Barlow, Tr. R. Soc. Can., II, (4), p. 64, 1909.	Dungan- nonite (nephelite syenite).	Also in Can. G. S. Mem. 6, p. 319, 1910.
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CLASS I. PERSALANE. SECTION I. C EXTREME OVER Z.

RANG 4. DOCALCIC. BORSOWASE. (H. S. WASHINGTON, 1903.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	22.52	16.31	2.20	n. d.	1.34	6.64	1.00	0.58	1.58					Corundum 47.51	99.40	3.240
A4. IV	.375	.160	.014	(.028)	.034	.118	.016	.006								22°

RANG 5. PERCALCIC. KYSCHTYMASE. (H. S. WASHINGTON, 1903.)

1	16.80	13.89	0.76	n. d.	0.61	7.26	0.38	0.13	0.76					Corundum 59.51	100.10	
A4. IV	.280	.136	.005	(.010)	.015	.129	.006	.001								

SUBCLASS III. Q+F+L EQUAL TO C+Z. ORDER 5. PERFELIC. SIBERARE. (H. S. WASHINGTON, 1903.)

SUBRANG 4-5. PRESODIC. BORSOWOSE. (H. S. WASHINGTON, 1903.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	I. III ^{5.4''4.}	or 3.34 ol 5.21 ab 5.24 an 32.86 ne 1.70 C 49.54	Borsowska, Ural Mountains, Russia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XVIII, p. 212, 1898.	Kyschtymite (corundum anorthosite).	In W. T., p. 217.
SUBRANG. NOT NEEDED.							
1	I. III(IV) ^{5.5.}	or 0.56 ol 2.07 ab 0.52 an 35.86 ne 1.42 C 59.51	Borsowska, Ural Mountains, Russia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XVII, p. 212, 1898.	Kyschtymite (corundum anorthosite).	In W. T., p. 217.

CLASS II. DOSALANE. (C. I. P. W., 1902.)

RANG 1-2. PREALKALIC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	89.25	2.20	3.00	n. d.	2.00	—	trace	4.00							100.45	
A4. IV	1.486	.022	.019	(.035)	.050	—	—	.043								
2	80.44	5.05	6.70	0.10	0.39	0.50	3.20	3.46				trace		SO ₂ 0.53	100.32	
A3. III	1.341	.050	.042	.001	.010	.009	.052	.037				—				

RANG 1-2. PREALKALIC.

1	83.59	5.42	trace	trace	trace	3.44	5.33	1.37	0.76						99.91	2.54
A3. III	1.393	.053	—	—	—	.062	.086	.015								

RANG 4-5. PREALCALIC.

1	71.70	6.90	0.96	3.74	2.82	11.37	0.66	0.10	0.22	0.08	1.11	0.09	0.05	CO ₂ trace Cl 0.16	99.96	
A2. II	1.195	.068	.006	.052	.071	.204	.011	.001			.014	—	—			

CLASS II. DOSALANE.

RANG 1. PERALKALIC. VARINGASE. (C. I. P. W., 1902.)

1	75.40	7.72	1.41	n. d.	1.26	1.55	8.09	4.52	0.43				0.12	Cl 0.12	100.62	2.39
A4. IV	1.257	.076	.009	(.018)	.032	.028	.130	.048					.002			

RANG 1. PERALKALIC. VARINGASE.

1	74.15	10.07	0.86	none	0.30	1.28	6.34	4.44	0.71		0.93	0.09	0.26	Cl 0.13 FeS ₂ trace BaO 0.04 CuO 0.06	99.66	
A1. I	1.236	.099	.005	—	.008	.023	.102	.047			.012	—	.004			
2	74.35	8.73	5.84	1.00	0.07	0.45	4.51	3.96	0.25				0.22		99.38	
B3. IV	1.239	.086	.037	.014	.002	.008	.073	.042					.003			
3	69.22	7.78	9.80	3.02	0.10	0.12	6.32	2.72	n. d.						99.08	
A3. III	1.154	.076	.061	.042	.003	.002	.102	.029								
4	73.65	9.52	5.12	0.96	0.04	0.31	4.84	4.30	1.23		0.29				100.26	
A3. III	1.228	.094	.032	.013	.001	.005	.078	.046			.004					
5	70.14	8.61	6.01	2.73	0.20	0.45	5.44	4.20	0.35	0.17	0.86	0.12	0.38	CO ₂ none ZrO ₂ 0.14 SO ₂ 0.06 BaO none		
A1. I	1.169	.084	.038	.038	.005	.008	.088	.045			.011	.001	.005			
6	69.91	8.58	1.81	5.86	0.28	0.33	6.41	4.71	0.22	0.13	0.75	0.16	0.24		99.39	
A2. II	1.165	.084	.011	.082	.007	.006	.103	.050			.009	.001	.003			
7	69.33	8.62	2.65	5.52	0.52	0.52	4.78	4.71	2.35	0.27	0.85	none	0.27		100.39	
A2. II	1.156	.084	.017	.076	.013	.009	.077	.050			.011	—	.004			

ORDER 2. DOQUARIC.

SUBRANG 1-2. PREPOTASSIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	(I)II.(1)2.1.1.	Q 74.79 ks 3.23 or 12.23 hy 10.02	McPhatle's location, Secucuni Land, Transvaal.	C. C. Gardt-hausen.	A. L. Hall, Tr. G. Soc. S. Afr., XIII, p. 14, 1911.	Quartz-mica rock.	
2	II.2(3).1.2.	Q 51.96 ac 18.02 or 20.57 di 1.94 ab 6.81 hy 0.10 mt 0.23 hm 0.32	Kara River, Nertchinsk, Transbaikal, Siberia.	Djakanow.	A. Karpinsky, Vh. Russ. Min. Ges., XLI, (1), p. 76, 1904.	Karite (quartz grorudite).	

SUBRANG 4-5. PRESODIC.

1	(I)II.2''1.4.	Q 57.90 ns 5.46 or 8.34 wo 7.19 ab 19.91	Berkeley, California.	C. Palache.	C. Palache, B. Dep. G. Un. Cal., I, p. 67, 1894.	Soda rhyolite.	In W. T., p. 123.
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SUBRANG 4-5. PRESODIC.

1	II''2''4''5.	Q 45.00 di 23.27 or 0.56 wo 5.22 ab 5.76 mt 1.39 an 15.57 il 2.13	Capc Royds, Ross Region, S. Victoria Land, Antarctica.	Burrows and Walkom.	J. W. E. David, pers. com.	Pyroxene granulite.	Erratic block. Igneous?
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ORDER 3. QUARFELIC. HISPANARE. (C. I. P. W., 1902.)

SUBRANG 2. DOPOTASSIC.

1	II.3.1.2(3).	Q 36.60 ac 4.16 or 26.68 ns 11.53 ab 14.67 di 0.31 hy 0.60	S. of Borax Lake, California.	W. H. Melville.	G. F. Becker, U. S. G. S. Mon. 13, p. 159, 1888.	Rhyolite obsidian.	In W. T., p. 219.
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SUBRANG 3. SODIPOTASSIC. VARINGOSE. (C. I. P. W., 1902.)

1	(I)II.3''1.3.	Q 32.25 ac 2.31 or 26.13 ns 5.49 ab 27.25 di 1.73 wo 1.74 il 0.61 tn 1.57	Sapira Cataract, Mazaruni River, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Br. G., p. 76, 1908.	Aplite.	In W. T., p. 219.
2	''II.3''1.3.	Q 35.28 ac 13.40 or 23.35 di 1.92 ab 23.06 hy 0.40 mt 1.86	Varingskollen, Hakedalen, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 66, 1890.	Grorudite.	Also in Eg. Kg., I, p. 48, 1894. In W. T., p. 219.
3	II''3(4).1.3(4).	Q 26.22 ac 25.41 or 16.12 di 0.49 ab 24.63 hy 4.79 mt 1.39	Landinosa River, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 42, 1906.	Riebeckite granite.	
4	''II.3(4).1.3.	Q 31.86 ac 13.86 or 25.58 di 1.21 ab 25.15 hy 0.40 mt 0.46 il 0.61	Le Fontane, San Pietro, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. W., Anh. 2, p. 22, 1912.	Comendite.	Also in N. J. Cb., 1912, p. 738.
5	II.3(4).1.3.	Q 27.60 ac 17.56 or 25.02 ns 1.34 ab 20.44 di 1.21 hy 4.80 il 1.67 ap 0.34	Monte San Elmo, Pantelleria.	H. S. Washington.	H. S. Washington, J. G., XXI, p. 703, 1913.	Aegirite pantellerite.	
6	II.3(4).1.(2)3.	Q 28.38 ac 5.08 or 27.80 ns 7.08 ab 17.82 di 0.75 hy 10.34 il 1.37 ap 0.34	Gelkhamar, Pantelleria.	H. S. Washington.	H. S. Washington, J. G., XXI, p. 706, 1913.	Hyalopantellerite.	
7	II.3(4).I.(2)3.	Q 28.02 ac 7.85 or 27.80 ns 3.17 ab 17.82 di 2.16 hy 9.28 il 1.67	Cantina Zitton, Pantelleria.	H. S. Washington.	H. S. Washington, J. G., XXI, p. 706, 1913.	Hyalopantellerite.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. VARINGASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
8	76.0	9.4	3.7	1.1	trace	0.7	4.0	5.2	0.7						100.8	2.56
B3. IV	1.267	.092	.023	.015	—	.013	.065	.055								
9	73.0	10.0	5.9	0.8	trace	0.3	4.6	4.3	1.4						100.3	2.51
B3. IV	1.217	.098	.037	.011	—	.005	.074	.046								
10	73.0	9.9	6.0	1.3	0.2	0.4	4.0	4.4	1.1						100.3	2.62
B3. IV	1.217	.097	.038	.018	.005	.007	.065	.047								
11	70.40	7.85	6.98	2.98	0.52	0.26	4.05	4.25	0.25		0.13		0.13	ZrO ₂ 1.65	99.65	
A2. II	1.173	.077	.044	.042	.013	.005	.066	.046			.002		.002			
12	70.25	8.75	7.90	1.62	0.65	0.51	3.82	4.12	0.75		0.06		0.13	ZrO ₂ 0.78	100.84	
A2. II	1.171	.086	.049	.022	.016	.009	.061	.043			.001		.002			

RANG 1. PERALKALIC. VARINGASE.

1	68.70	6.85	9.93	1.14	0.26	1.34	7.01	1.58	0.50		0.26		trace	ZrO ₂ 3.71	101.28	
B3. IV	1.145	.067	.062	.016	.007	.024	.113	.017			.003		—			

RANG 2. DOMALKALIC.

1	66.44	17.43	2.10	1.60	3.70	0.65	0.99	4.76	2.13			trace		CO ₂ 0.10 SnO ₂ trace	99.90	
A3. III	1.107	.171	.013	.022	.093	.012	.016	.051				—				
2	74.10	11.53	0.24	3.53	2.15	1.95	0.45	4.25	0.98		0.67	0.36	0.10	CO ₂ none	100.31	
A2. II	1.235	.113	.002	.049	.054	.035	.007	.046			.008	.003	.001			
3	71.05	12.36	1.10	3.50	2.45	1.52	0.80	4.65	1.67		0.86	0.31	0.15	CO ₂ none	100.42	
A2. II	1.186	.121	.007	.049	.061	.027	.013	.050			.011	.002	.002			

RANG 2. DOMALKALIC.

1	69.27	12.56	2.89	4.51	0.91	1.44	3.12	3.05	0.76		0.78	0.06	trace		99.35	2.724
B2. III	1.155	.123	.018	.062	.023	.026	.050	.033			.009	—	—			
2	73.12	10.25	2.93	1.05	1.29	3.68	2.74	2.98	1.76		0.64				100.44	
A3. III	1.219	.100	.018	.015	.032	.064	.044	.032			.008					
3	66.35	14.54	0.39	5.61	1.60	2.03	2.36	3.27	2.60		0.96	0.17	0.03		99.91	
A2. II	1.106	.143	.002	.078	.040	.036	.033	.035			.012	.001	—			
4	69.38	12.56	2.40	2.25	1.47	3.72	2.77	3.75	1.05	0.09	0.52	0.12	0.04	CO ₂ 0.01 ZrO ₂ none SO ₃ none Cl none F none S none Cr ₂ O ₃ none V ₂ O ₅ trace NiO none BaO 0.10 SrO trace	100.23	
A1. I	1.156	.123	.015	.031	.037	.066	.045	.040			.007	.001	—			

ORDER 3. QUARFELIC. HISPANARE—Continued.

SUBBRANG 3. SODIPOTASSIC. VARINGOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
8	(I)II.3''1.(2)3.	Q 35.04 ac 10.63 or 30.58 ns 0.61 ab 19.39 di 3.23 hy 0.26	Morne Rouge, Obock, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est. Afr., p. 75, 1906.	Microgrante.	Also in C. R., CXL, p. 450, 1905.
9	(I)II.3(4).1.3.	Q 32.16 ac 10.16 or 25.58 wo 0.58 ab 27.25 mt 2.55 hm 0.64	Karoma, L'Ouache, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est. Afr., p. 75, 1906.	Microgranite.	Also in C. R., CXL, p. 450, 1905.
10	(I)II.3(4).1.3.	Q 33.42 ac 6.93 or 26.13 di 1.08 ab 26.20 wo 0.23 mt 4.18 hm 0.80	Ouardji, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est. Afr., p. 75, 1906.	Paisanite.	Also in C. R., CXL, p. 450, 1905.
11	II.3''1.(2)3.	Q 30.36 ac 16.17 or 25.58 di 1.21 ab 16.24 hy 5.68 Z 2.56 mt 2.09 il 0.30	Ampasibitika, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 235, 1903.	Arfvedson- ite granite.	Center of dike. Cf. No. 12 below.
12	''II.3''1.3.	Q 32.94 ac 8.32 or 23.91 di 1.97 ab 22.53 hy 0.73 Z 1.28 mt 5.10 hm 1.44	Ampasibitika, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 235, 1903.	Aegirite granite.	Border of dike. Cf. No. 11 above.

SUBBRANG 4. DOSODIC.

1	II''3''1.4.	Q 25.26 ac 28.64 or 9.45 di 4.54 ab 26.20 wo 0.46 Z 5.49 il 0.46	Ampasibitika, Sakalave, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 235, 1903.	Aegirite granite.	
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SUBBRANG 2. DOPOTASSIC.

1	(I)II.3.(1)2.2.	Q 34.74 hy 10.49 or 28.36 mt 3.02 ab 8.38 an 3.35 C 9.38	Tamaya, Chile.	C. Schwartz.	v. Groddeck, Z. D. G. G., XXXIX, p. 252, 1887.	Dike rock.	In W. T., p. 219.
2	(I)II.3.2''2(3).	Q 46.38 hy 10.68 or 25.58 mt 0.46 ab 3.67 il 1.22 an 6.95 ap 1.01 C 3.57	Uncles Bay, Lake Brunner, South Island, New Zealand.	J. S. Macclau- rin.	P. G. Morgan, N. Z. G. S. B. 13, p. 78, 1911.	Granite.	
3	(I)II.3.2.2.	Q 40.44 hy 10.46 or 27.80 mt 1.62 ab 6.81 il 1.67 an 5.56 ap 0.67 C 3.87	Strauchon Creek, Mount Tekinga, New Zealand.	J. S. Macclau- rin.	P. G. Morgan, N. Z. G. S. B. 13, p. 78, 1911.	Granite.	

SUBBRANG 3. SODIPOTASSIC.

1	(I)II.3(4).2.3(4).	Q 32.82 hy 6.92 or 18.35 mt 4.18 ab 26.20 il 1.37 an 7.23 C 1.43	Whitson Lake, Sudbury, Ontario.	T. L. Walker.	T. L. Walker, Q. J. G. S., LIII, p. 56, 1897.	Granite.	In W. T., p. 219.
2	(I)II.3.2.''3.	Q 38.58 di 6.91 or 17.79 wo 0.93 ab 23.06 mt 1.62 an 6.67 il 1.22 hm 2.08	Fano, Marche, Italy.	A. Martelli.	A. Martelli, B. Soc. G. It., XXXVIII, p. 251, 1909.	Quartz porphyry.	
3	''II.3(4).2.3.	Q 29.88 hy 12.45 or 19.46 mt 0.46 ab 19.91 il 1.52 an 9.17 ap 0.34 C 3.77	Fuse, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sci. Rep. Tohoku Un., (2), I, p. 35, 1913.	Schistose granite.	
4	(I)II.3(4).2.3.	Q 29.94 di 5.59 or 22.24 hy 2.20 ab 23.58 mt 3.48 an 10.56 il 1.06 ap 0.34	Braidwood, New South Wales.	H. P. White.	G. W. Card. pers. com.	Granite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	64.04	15.83	2.16	2.40	2.72	3.60	3.52	1.43	1.60		0.30	1.56	0.15		99.31	2.74
B2. IV	1.067	.155	.014	.033	.068	.064	.056	.015			.004	.0011	.002			
2	73.56	11.19	1.44	3.36	2.02	1.97	3.26	2.90	0.30	0.14	0.21	trace	0.19	CO ₂ 0.11	100.65	2.54
A2. II	1.226	.110	.009	.047	.051	.036	.053	.031			.003	—	.003			

RANG 3. ALKALICALCIC. ALMERASE. (C. I. P. W., 1902.)

1	64.38	14.09	6.10	3.68	2.04	4.51	0.55	3.72	0.82				0.33		100.22	
A3. III	1.073	.138	.038	.051	.051	.080	.009	.039					.005			

RANG 3. ALKALICALCIC. ALMERASE.

1	60.15	18.23	1.51	6.04	3.22	4.01	1.28	1.68	0.55		1.34	0.23	0.29	S 0.54 NiO 0.17 BaO 0.25 SrO 0.14 Cu 0.16	99.79	
A1. I	1.003	.179	.009	.084	.081	.071	.021	.018			.017	.002	.004			
2	63.75	17.62	3.00	3.26	3.41	2.50	1.75	2.40	2.77						100.45	
A3. III	1.063	.172	.019	.045	.085	.045	.030	.025								
3	68.90	13.39	3.45	1.39	4.10	3.31	2.07	2.88	0.90			0.20			100.59	
A3. III	1.148	.131	.022	.019	.103	.059	.034	.031				.001				
4	70.45	11.68	2.43	2.71	2.14	4.13	2.02	2.28	0.97		0.50	0.16	0.17	BaO trace	99.64	
A2. II	1.174	.114	.015	.038	.054	.073	.032	.026			.006	.001	.002			
5	69.95	12.30	2.09	2.72	2.03	4.26	1.99	3.13	0.91		0.42	0.12	0.13	BaO 0.06	100.11	
A2. II	1.166	.120	.013	.038	.051	.076	.032	.033			.005	.001	.002			
6	70.92	12.20	1.07	5.42	2.61	3.78	2.46	2.49	n. d.				0.14		101.09	
B3. IV	1.182	.120	.007	.075	.065	.068	.040	.027					.002			
7	72.39	13.12	0.42	4.48	1.87	3.17	1.54	1.92	0.11	0.02	0.76	none	0.05	CO ₂ none SO ₂ none Cl none NiO 0.06 BaO none SrO none	99.91	2.427
A1. I	1.207	.128	.003	.063	.047	.057	.025	.020			.010	—	—			
8	71.22	13.52	0.77	5.30	2.38	3.52	1.48	2.28	n. d.				0.28		100.75	2.443
B3. IV	1.187	.133	.005	.074	.060	.063	.024	.025					.004			
9	70.62	13.48	0.85	4.44	2.42	3.09	1.27	2.22	0.01	0.06	0.90	none	0.42	CO ₂ none SO ₂ trace Cl trace NiO trace	99.78	2.454
A2. II	1.177	.132	.005	.062	.061	.055	.021	.023			.011	—	.006			
10	69.80	15.02	0.40	4.65	2.47	3.20	1.29	2.56	n. d.	n. d.	0.80		0.18	BaO none SrO none Li ₂ O trace	100.37	2.424
A2. II	1.163	.147	.003	.065	.062	.057	.021	.028			.010		.003			
11	72.40	12.56	none	4.03	1.87	2.09	2.14	1.95	1.25	0.15	0.77	0.09	0.50	CO ₂ none SO ₂ 0.08	99.88	
A2. II	1.207	.123	—	.056	.047	.038	.034	.021			.010	—	.007			

ORDER 3. QUARFELIC. HISPANARE—Continued.

SUBRANG 4. DOSODIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	"II.3(4).2.4.	Q 29.76 hy 9.04 or 8.34 mt 3.25 ab 29.34 il 0.61 an 8.34 ap 3.70 C 5.51	Smith's Mill, Victoria District, Vancouver Island, British Columbia.	M. F. Connor.	C. H. Clapp. Can. G. S. Mem. 36, p. 64, 1913.	Quartz diorite gneiss.	Cf. No. 132, I.4.2.3.
2	(I)II.3(4).2.(3)4.	Q 34.26 di 2.29 or 17.24 hy 3.99 ab 27.77 mt 2.09 an 7.23 il 0.46	Musgrave Penin- sula, Carnley Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islands, p. 720, 1909.	Granite.	

SUBRANG 2. DOPOTASSIC.

1	"II.3.3(4).2.	Q 33.36 hy 7.48 or 21.68 mt 8.82 ab 4.72 an 22.24 C 1.02	Brockenrod, Hesse.	F. Kutscher.	C. Chelius, Erl. G. Kte. Hesse, Bl. Breunbach, p. 24, 1897.	Granite.	In W. T., p. 221.
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SUBRANG 3. SODIPOTASSIC. ALMEROSE. (C. I. P. W., 1902.)

1	II.3.3(4).3.	Q 29.88 hy 16.28 or 10.01 mt 2.09 ab 11.00 il 2.58 an 17.79 ap 0.67 C 7.75	Creighton Mine, Sudbury, Ontario.	M. T. Culbert.	A. P. Coleman, Rep. Bur. Min. Ont., XIV, (III), p. 112, 1905.	Norite.	Also in J. G., XV, p. 770, 1907.
2	"II.3"3.3.	Q 31.92 hy 11.93 or 13.90 mt 4.41 ab 15.72 an 12.51 C 7.34	Hoyazo, Cabo de Gata, Spain.	J. Savelsberg.	A. Osann, Z. D. G. G., XL, p. 701, 1888.	Cordierite andesite.	In W. T., p. 219.
3	"II.3(4).3.3.	Q 32.58 hy 10.20 or 17.24 mt 4.41 ab 17.82 hm 0.48 an 15.57 ap 0.34 C 1.02	Calca Foggio, Corsica.	Not stated.	J. Deprat, B. Soc. G. Fr., (4), VI, p. 434, 1906.	Quartz diorite.	
4	(I)II.3.3.3.	Q 37.62 di 3.16 or 14.46 hy 6.38 ab 16.77 mt 3.48 an 15.57 il 0.91 ap 0.34	Tarmlangen, Skattmansö, Uppland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	
5	(I)II.3"3.3.	Q 34.50 di 4.05 or 18.35 hy 6.04 ab 16.77 mt 3.02 an 15.29 il 0.76 ap 0.34	Upsala, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	
6	"II.3(4).3.3(4).	Q 31.56 di 3.50 or 15.01 hy 13.72 ab 20.96 mt 1.62 an 14.73	Tebrung, Dendang, Java.	C. v. John.	F. E. Suess, Jb. G. R.-A., Wien, L, p. 237, 1901.	Moldavite.	
7	(I)II.3.3.3.	Q 43.56 hy 11.30 or 11.12 mt 0.70 ab 13.10 il 1.52 an 15.85 C 2.65	Mount Elephant, Victoria.	G. Ampt.	H. S. Summers, Pr. R. Soc. Vict., XXI, (2), p. 425, 1909.	Obsidianite.	"Button."
8	"II.3.3.3.	Q 38.04 hy 15.64 or 13.90 mt 1.16 ab 12.58 an 17.51 C 2.14	Between Everard and Frazer Ranges, Australia.	C. v. John.	F. E. Suess, Jb. G. R.-A., Wien, L, p. 238, 1901.	Moldavite.	
9	"II.3.3.3.	Q 41.40 hy 12.96 or 12.79 mt 1.16 ab 11.00 il 1.67 an 15.29 C 3.37	Coolgardie, West Australia.	Not stated.	Ann. Rep. Secy. Mines, Vict., (1907), p. 63, 1908.	Obsidian "buttons."	
10	(I)II.3.3.3.	Q 38.28 hy 13.46 or 15.57 mt 0.70 ab 11.00 il 1.52 an 15.85 C 4.18	Upper Weld Tindrift, Tasmania.	W. F. Hille- brand.	U. S. G. S. B. 228, p. 276, 1904.	Moldavite.	"Volcanic but- tons" Cf. Pr. R. Soc. Vict. XXI, p. 425, 1909.
11	(I)II.3."3.3(4)	Q 42.06 hy 11.70 or 11.68 il 1.52 ab 17.82 an 10.56 C 3.06	Inangahua Road, Waitahu, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Granite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ALMERASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	67.04	11.40	0.78	3.75	3.52	7.60	2.70	1.00	0.16	0.09	1.68	0.12		CO ₂ none	99.84	
A2. II	1.117	.112	.005	.052	.088	.136	.044	.011			.021	.001				
2	68.45	10.00	5.71	2.59	3.26	6.20	1.98	1.18	0.62	0.18	0.20	0.25	0.05	CO ₂ trace	100.67	
A2. II	1.141	.098	.036	.036	.082	.111	.032	.013			.003	.002	.001			
3	74.67	8.37	0.95	3.37	2.52	5.19	2.09	1.31	0.30	0.26	1.10	0.57	0.09	ZrO ₂ trace	100.79	
A2. II	1.245	.082	.006	.047	.063	.093	.034	.014			.014	.004	.001			

RANG 4. DOCALCIC.

1	64.68	16.80	6.57	1.01	2.50	3.88	trace	4.01	n. d.	n. d.			0.20		99.65	
A3. III	1.078	.164	.041	.014	.063	.070	—	.042					.003			

RANG 4. DOCALCIC.

1	55.00	16.83	10.19	3.60	5.16	5.91	1.00	0.90	n. d.	n. d.		0.67		FeS ₂ 0.23	99.49	2.774
B3. IV	.917	.165	.064	.050	.129	.105	.016	.010				.005				

RANG 4. DOCALCIC.

1	62.51	20.60	2.42	4.55	2.32	4.55	2.06	0.82	n. d.		0.38	0.16			100.27	
A2. II	1.042	.202	.015	.064	.058	.081	.033	.009			.005	.001				
2	62.63	12.19	2.98	2.89	1.49	4.84	2.12	0.82	4.11	3.94	1.53	0.35			99.89	
A2. II	1.044	.120	.019	.040	.087	.087	.084	.009			.019	.002				

RANG 5. PERCALCIC.

1	69.67	13.26	0.63	4.48	1.37	8.96	0.24	0.18	0.31	0.04	1.18	trace	trace	CO ₂ trace	100.32	
A3. III	1.161	.130	.004	.063	.034	.160	.004	.002			.015	—	—			

CLASS II. DOSALANE.

RANG 1. PERALKALIC. PANTELLERASE. (C. I. P. W., 1902.)

1	68.68	10.11	6.72	3.02	—	—	4.51	6.42	n. d.						99.46	
A4. IV	1.145	.099	.042	.042	—	—	.073	.068								

RANG 1. PERALKALIC. PANTELLERASE.

1	73.68	11.05	3.93	1.45	none	0.48	5.20	4.05	0.08	0.17	0.57	none	trace	ZrO ₂ 0.24 Cl trace	100.90	2.694
A2. II	1.228	.108	.024	.020	—	.009	.084	.044			.007	—	—			
2	73.82	10.59	2.18	2.98	0.04	0.28	4.20	4.57	0.49	0.39	0.13	0.02	none	ZrO ₂ none F 0.06 S none BaO none	99.75	
A1. I	1.230	.104	.014	.042	.001	.005	.068	.049			.002	—	—			

ORDER 3. QUARFELIC. HISPANARE—Continued.

SUBRANG 4. DOSODIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	II.3(4).3.4.	Q 29.34 di 15.68 or 6.12 hy 4.72 ab 23.06 mt 1.16 an 15.85 il 3.19 ap 0.34	Fishermans Island, Boothbay quad- rangle, Maine.	M. W. Adams.	I. H. Ogilvie, Ann. N. Y. Ac. Sci., XVII, p. 534, 1907.	Quartz- augite diorite.	
2	II.3.3.4.⊙.	Q 37.92 di 11.02 or 7.23 hy 3.10 ab 16.77 mt 7.66 il 0.46 hm 0.48 ap 0.67	Fredericksburg, Virginia.	W. M. Thorn- ton.	T. L. Watson, Va. G. S., B. IA, p. 81, 1909.	Granite gneiss.	
3	II.3."3.4.	Q 45.12 di 10.39 or 7.78 hy 4.95 ab 17.82 mt 1.39 an 9.45 il 2.13 ap 1.34	Cape Royds, Ross Region, S. Victoria Land, Antarctica.	Burrows and Walkom.	J. W. E. David, pers. com.	Pyroxene granulite.	Erratic block. Igneous?

SUBRANG 1-2. PREPOTASSIC.

1	(I)II.3.(3)4.1.	Q 37.38 hy 6.30 or 23.35 mt 3.94 ab — hm 3.84 an 19.46 C 5.30	Uralla, New South Wales.	J. C. H. Min- gaye.	R. H. Walcott, Pr. R. Soc. Vict., XI, p. 30, 1898.	(Moldavite.)	"Volcanic button." Not in W. T.
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SUBRANG 3. SODIPOTASSIC.

1	II.3".4.3(4).	Q 27.36 hy 12.90 or 5.56 mt 11.60 ab 8.38 hm 2.24 an 24.46 ap 1.68 C 5.11	Zonderwater, Transvaal.	H. Eckstein and Co.	C. B. Horwood, Tr. G. S. So. Afr., XIII, p. 51, 1911.	Granophyre.	
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SUBRANG 4-5. PRESODIC.

1	(I)II.3"."4.4.	Q 31.56 hy 11.61 or 5.00 mt 3.48 ab 17.29 il 0.76 an 22.52 C 8.06	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 550, 1904.	Cordieritized andesite.	Near Subclass II.
2	(I)II.3.(3)4.4.	Q 35.40 di 0.65 or 5.00 hy 3.66 ab 17.82 mt 4.41 an 21.41 il 2.89 ap 0.67	Morateno, Sakalave Region, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 19, 1913.	Dacite pitch- stone.	

SUBRANG. NOT NEEDED.

1	II.3.5.0.	Q 45.78 di 8.42 or 1.12 hy 4.97 ab 2.10 mt 0.93 an 34.47 il 2.28	Cape Royds, Ross Region, S. Victoria Land, Antarctica.	Burrows and Walkom.	T. W. E. David, pers. com.	Not named.	Igneous? Erratic block.
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ORDER 4. QUARDOFELIC. AUSTRARE. (C. I. P. W., 1902.)

SUBRANG 2. DOPOTASSIC.

1	II.4.1.2".	Q 20.46 ac 19.40 or 37.81 hy 5.54 ab 16.24	Scala della, Spelunca, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 38, 1906.	Riebeckite micropeg- matite.	
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SUBRANG 3. SODIPOTASSIC. GRORUDOSE. (C. I. P. W., 1902.)

1	(I)II.4.1.3".	Q 28.80 ac 9.24 or 24.46 di 2.23 ab 33.54 mt 0.93 Z 0.37 il 1.06	Ilimausak, South Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 224, 1911.	Comendite.	
2	(I)II.(3)4.1.3.	Q 30.54 ac 6.01 or 27.21 di 1.24 ab 28.82 hy 4.59 mt 0.23 il 0.30	Rosemont, Colorado Springs quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. B. 419, p. 100, 1910.	Riebeckite granite.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. PANTELLERASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3	69.47	11.73	5.08	0.48	0.99	2.63	3.46	5.34	1.28	0.31		trace	trace		100.77	
A3. III	1.158	.115	.032	.007	.025	.046	.056	.056				—	—			
4	67.91	12.21	4.17	2.97	1.18	2.03	3.83	4.47	0.67		0.93	0.18	trace		100.55	
A2. II	1.132	.120	.026	.042	.029	.036	.061	.048			.012	.001	—			
5	70.15	10.60	5.77	1.74	0.35	0.72	5.30	4.09	trace		0.65		0.52		99.89	
A2. II	1.169	.104	.036	.024	.009	.013	.085	.043			.008		.007			
6	66.50	10.90	9.85	2.34	0.60	0.64	5.56	4.54	0.20		trace	trace	trace		101.23	
B3. IV	1.108	.107	.062	.033	.015	.011	.090	.048			—	—	—			
7	69.01	12.16	2.07	2.40	0.93	2.23	3.65	4.81	0.42	0.44	0.97	0.11	0.06		99.73	
A2. II	1.160	.119	.013	.033	.023	.041	.059	.051			.012	.001	.001			
8	60.13	10.23	4.21	3.12	4.89	5.54	3.10	4.63	1.81		0.72	1.26	0.03	s 0.05	99.72	2.796
A2. II	1.002	.100	.026	.043	.122	.099	.050	.049			.009	.009	—			
9	68.09	11.15	2.85	0.95	1.10	1.98	7.42	5.16	0.56		0.41	1.11			100.78	
A2. II	1.135	.109	.018	.014	.028	.036	.119	.055			.005	.008				
10	61.18	17.04	6.57	1.75	1.27	0.24	5.00	4.84	1.15	0.48	0.41	0.10		CO ₂ 0.05 SO ₂ 0.15	100.23	2.66
A2. II	1.020	.167	.041	.025	.032	.004	.081	.051			.005	.001				
11	67.88	12.27	3.39	6.18	1.03	0.70	3.76	3.63	1.17			0.08			100.09	
A3. III	1.131	.120	.021	.086	.026	.013	.061	.038				—				
12	65.66	13.77	2.19	4.88	0.86	1.40	3.23	5.72	1.46		0.57	0.42			100.16	
A2. II	1.094	.135	.014	.068	.022	.025	.052	.061			.007	.003				
13	65.64	13.14	5.25	1.31	2.02	2.86	4.32	4.87	0.77		0.29	0.15			100.63	
A2. II	1.094	.129	.033	.018	.051	.051	.069	.052			.004	.001				
14	66.10	13.45	6.30	0.45	0.92	0.60	5.42	5.04	2.10						100.38	
A3. III	1.120	.132	.039	.006	.023	.011	.087	.054								
15	66.19	14.22	3.08	1.70	0.54	1.24	4.98	6.25	1.14	0.15	0.19				99.68	2.68
A3. III	1.103	.139	.019	.024	.014	.022	.081	.067			.002					
16	66.08	11.63	1.44	2.94	2.56	3.33	3.36	5.29	0.86	0.06	1.29	0.83			99.67	2.70
A2. II	1.101	.114	.009	.041	.064	.059	.054	.056			.016	.006				
17	72.21	9.72	3.26	1.07	0.29	0.82	4.42	4.98	1.96	0.24	0.62	0.10	0.05		99.74	
A2. II	1.204	.093	.020	.015	.007	.014	.071	.053			.008	.001	.001			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. GRORUDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	(I)II.4.1.3.	Q 24.72 di 5.40 or 31.14 wa 2.09 ab 29.34 mt 1.62 an 0.83 hm 4.00	Near Watuska, Walker region, Nevada.	D. T. Smith.	D. T. Smith, Un. Cal., Dep. G., B. IV, p. 26, 1904.	Rhyolite.	
4	(I)II.4.1''.3.	Q 23.94 di 4.85 or 26.69 hy 1.13 ab 31.96 mt 6.03 an 3.06 il 1.82 ap 0.34	Lövstakken, Bergen, Norway.	O. Heidenreich.	C. F. Kolderup Berg. Mus. Aarb., 1902, p. 26.	Granite.	
5	II.4.1.3''.	Q 24.96 ac 11.09 or 23.91 di 3.03 ab 31.96 hy 0.83 mt 2.58 il 1.22	Grussletten, n. Grorud, Christiania, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 48, 1894.	Grorudite.	Center of dike. In W. T., p. 221.
6	II.4.1.3.⊙	Q 18.84 ac 14.32 or 26.69 di 2.44 ab 30.92 hy 0.60 mt 7.19	Grussletten, Grorud, Christiania, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 48, 1894.	Grorudite.	Border of dike. In W. T., p. 221.
7	(I)II.4.1''.3.	Q 24.72 di 6.52 or 28.36 hy 0.20 ab 30.92 mt 3.02 an 2.50 il 1.82 ap 0.34	Klondyke, Bornholm Island, Denmark.	M. Dittrich.	G. Kalb, Mt. Nw. Ver. Neup., XLV, p. 21, 1913.	Pegmatite.	L. Milch, pers. com.
8	II''.4.1.3.	Q 12.36 di 14.85 or 27.24 hy 6.56 ab 26.20 mt 6.03 an 0.28 il 1.37 ap 3.02	Olbersdorf, n. Aachen, Rhein Preussen.	A. Lindner.	E. Dathe, Jb. Pr. G. L.-A., XIX, p. 130, 1899.	Minette.	Not in W. T.
9	II.4.1.3.⊙	Q 19.08 ac 8.32 or 30.58 ns 5.49 ab 28.30 di 2.00 hy 3.02 il 0.76 ap 2.69	Forst, Westerwald, Hesse.	H. Schmeidehöhn.	H. Schmeidehöhn, Jb. Pr. G. L.-A., XXX, (2), p. 306, (1909), 1910.	Arfvedsonite, trachyte.	
10	(I)II.4(5).1.3(4).	Q 11.76 hy 3.20 or 28.36 mt 4.64 ab 42.44 il 0.76 C 3.16 hm 3.36 ap 0.34	Rupbach Thal, Hesse Nassau.	G. Butzbach.	R. Brauns, N. J. B. B., XXVII, p. 307, 1909.	Porphyry.	
11	''II.4.1(2).3(4).	Q 25.20 hy 11.18 or 21.13 mt 4.87 ab 31.96 an 3.61 C 0.82	Abruzzan, n. Cunnorsdorf, Riesengebirge.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 45, 1909.	Schliere in granite.	Cf. No. 183, I.4.1.3.
12	(I)II.4.1(2).3.	Q 19.02 hy 8.40 or 33.92 mt 3.25 ab 27.25 il 1.06 an 4.17 ap 1.01 C 0.71	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 26, 1909.	Schliere in granite.	Cf. No. 270, I.4.2.3.
13	''II.4.1.3.	Q 15.66 di 8.64 or 28.91 hy 1.10 ab 36.15 mt 3.25 an 2.22 il 0.61 hm 2.89 ap 0.34	Wahnitz, n. Meissen, Saxony.	E. Worm.	E. Worm, In. Diss. Leip., p. 44, 1913.	Syenite aplite.	
14	(I)II.4''.1.3''.	Q 15.48 ac 4.16 or 30.02 di 2.38 ab 40.87 hy 1.20 mt 1.39 hm 3.84	Holbak, Siebenbürgen, Hungary.	C. v. John.	C. v. John, Jb. G. R.-A., Wien, XLIX, p. 566, 1899.	Sanidinite.	In W. T., p. 221.
15	(I)II.4(5).1.3.	Q 11.10 ac 4.16 or 37.25 di 5.07 ab 37.73 hy 0.46 mt 2.32 il 0.30	Voralp, Aarmassif, Switzerland.	O. Fischer.	O. Fischer, T. M. P. M., XXIV, p. 57, 1905.	Quartz syenite.	
16	II.4.1.3.⊙	Q 19.08 di 7.78 or 31.14 hy 4.79 ab 28.30 mt 2.09 an 1.11 il 2.43 ap 2.02	Val Puntaglia, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite.	
17	(I)II.(3)4.1.3.	Q 31.14 ac 9.24 or 29.47 ns 1.10 ab 22.01 di 2.57 hy 0.46 il 1.22 ap 0.34	Cuddia Nera, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 697, 1913.	Comendite.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. PANTELLERASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
18	69.79	11.91	5.35	1.43	0.25	0.25	5.66	4.59	0.17	0.04	0.89	0.13	0.20		100.66	
A2 II	1.163	.117	.034	.020	.006	.004	.001	.049			.011	.001	.003			
19	67.83	12.87	1.81	4.54	0.30	0.17	6.03	4.83	0.13	0.02	0.83	0.08			99.49	
A2 II	1.131	.126	.012	.063	.008	.003	.007	.051								
20	67.32	9.55	6.73	0.81	0.20	0.20	5.71	4.48	3.15	0.49	0.59	0.08	0.24		99.55	
A2 II	1.122	.094	.042	.011	.005	.001	.002	.048			.007	.001	.003			
21	66.97	11.71	2.05	5.88	0.13	0.46	6.89	4.80	0.43	0.03	0.92	0.18	0.16	ZrO ₂ 0.12 SO ₃ 0.23 BaO none	100.09	
A1 I	1.101	.113	.013	.082	.003	.008	.111	.051			.012	.001	.002			
22	64.54	11.49	5.14	2.99	0.89	0.64	5.46	4.66	1.11	2.12	0.90	0.16	0.13	ZrO ₂ 0.08 SO ₃ 0.17 BaO none	100.48	
A1 I	1.076	.113	.032	.042	.032	.011	.088	.050			.011	.001	.002			
23	63.77	11.18	5.02	2.58	0.51	1.37	5.55	4.35	2.72	1.23	0.94	0.14	0.26		99.67	
A2 II	1.063	.110	.031	.036	.013	.025	.090	.047			.012	.001	.003			
24	62.95	12.57	1.73	4.14	0.27	3.07	4.52	4.24	1.34	0.39	1.33		trace		99.55	
A3 III	1.019	.153	.029	.057	.007	.055	.073	.044			.017					
25	68.94	11.10	3.18	1.90	0.19	0.82	5.53	4.50	3.40			trace	0.20		99.86	
A3 III	1.134	.112	.020	.026	.005	.014	.089	.048					.003			
26	67.44	11.59	4.48	1.35	0.37	2.08	6.68	4.24	0.62			0.12	0.34		99.31	
B2 III	1.124	.114	.028	.019	.009	.038	.108	.045				.001	.005			
27	1.0	10.1	6.0	2.3	trace	0.6	5.2	5.1	0.9						101.2	2.51
C2 V	1.183	.209	.035	.032		.011	.084	.054								
28	69.1	10.5	3.6	6.4	0.1	0.4	6.2	4.3	none						100.6	2.51
B3 IV	1.157	.133	.023	.089	.002	.007	.100	.046								
29	68.3	12.1	6.2	2.2	0.1	0.6	6.1	4.5	0.2						100.5	2.47
B3 IV	1.142	.119	.030	.051	.002	.011	.098	.048								
30	70.61	8.69	2.52	5.96	0.07	0.61	6.77	4.46	0.10		0.15		0.34		100.18	
A2 II	1.177	.084	.016	.083	.002	.011	.110	.048			.002		.005			
31	64.00	10.13	6.30	3.86	0.31	1.15	7.59	4.59	0.17		0.78		0.37		99.88	
A2 II	1.067	.092	.039	.054	.008	.026	.123	.049			.010		.005			
32	70.85	9.9	5.00	1.4	0.25	none	3.98	4.68	0.50		0.06		0.12	ZrO ₂ 3.48	99.56	
A2 II	1.181	.098	.031	.017	.006		.063	.050			.001		.002			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. SODIPOTASSIC. GRORUDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
18	"II.4.1.3".	Q 21.78 ac 10.63 or 27.24 hy 0.60 ab 35.63 mt 2.09 il 1.67 hm 0.32 ap 0.34	Costa Zeneti, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 703, 1913.	Aegirite pantellerite.	
19	II.4.1.3.⊙	Q 15.36 ac 5.54 or 28.36 ns 1.22 ab 39.30 hy 7.80 il 1.52 ap 0.34	Costa Zeneti, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 706, 1913.	Pantellerite obsidian.	
20	II.4.1.3.⊙	Q 22.44 ac 19.40 or 26.69 ns 0.49 ab 24.10 hy 1.03 il 1.42 ap 0.34	Rione Buccarame, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 703, 1913.	Pantellerite pumice.	
21	II.4.1.3.⊙	Q 14.70 ac 6.01 or 28.36 ns 4.15 ab 33.54 di 1.24 hy 9.01 il 1.82 ap 0.34	Khagiar, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 706, 1913.	Hyalopan- tellerite.	
22	II.4.1.3.⊙	Q 15.12 ac 11.55 or 27.80 di 1.76 ab 33.01 hy 3.38 mt 1.62 il 1.67 ap 0.34	Costa Zeneti, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 693, 1913.	Pantelleritic trachyte.	
23	II.4.1.3".	Q 14.34 ac 12.47 or 26.13 di 5.20 ab 33.01 hy 1.42 mt 0.93 il 1.82 ap 0.34	Punta Pozzolana, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 693, 1913.	Pantelleritic trachyte.	
24	"II.4.1.3(4).	Q 16.08 di 4.24 or 24.46 wo 3.60 ab 38.25 mt 6.73 an 1.67 il 2.58	Southern Ural Mountains, Russia.	Not stated.	A. Ginsberg, Ann. Inst. Polyt St. Pet., XV, p. 210, 1911.	Rapakivi granite.	
25	(I)II.4.1.3".	Q 18.12 ac 8.32 or 26.69 di 3.41 ab 37.20 hy 2.28 mt 0.46	Aden, Arabia.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XXIV, p. 197, 1908.	Pantellerite.	
26	II.4.1.3(4).	Q 14.94 ac 12.94 or 25.02 ns 1.34 ab 36.15 di 7.90 wo 0.23 ap 0.34	Aden, Arabia.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XXIV, p. 193, 1908.	Aegirite trachyte.	
27	II.4.1.3.⊙	Q 23.58 ac 17.56 or 30.02 ns 0.12 ab 23.58 di 2.73 hy 2.77	Yaba L'Aouache, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est. Afr., p. 75, 1906.	Pantellerite.	Also in C. R., CXL, p. 450, 1906.
28	II.4.1.3.⊙	Q 19.38 ac 10.63 or 25.58 ns 2.44 ab 29.87 di 1.70 hy 11.16	Fantalé, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est. Afr., p. 75, 1906.	Pantellerite obsidian.	Also in C. R., CXXXVII, p. 878, 1903.
29	II.4.1.3".	Q 17.40 ac 12.47 or 26.69 di 2.73 ab 37.20 hy 1.06 mt 2.78	Tadetchamalka, French Somali.	H. Arsandaux.	H. Arsandaux, Roches Est. Afr., p. 75, 1906.	Pantellerite.	Also in C. R., CXXXVII, p. 878, 1903.
30	II.(3)4.1."3.	Q 27.12 ac 7.39 or 26.69 ns 7.08 ab 18.86 di 2.70 hy 9.97 il 0.30	Lake Naivasha, British East Africa.	G. T. Prior.	G. T. Prior, Min. Mag., XIII, p. 246, 1903.	Soda rhyolite (pantellerite).	
31	II(III).4".1.3..	Q 10.44 ac 18.02 or 27.24 ns 3.78 ab 27.77 di 6.23 hy 5.32 il 1.52	Lake Nakuru, British East Africa.	G. T. Prior.	G. T. Prior, Min. Mag., XIII, p. 245, 1903.	Phonolitic obsidian (pantelleritic obsidian).	
32	(I)II."4.1.3.	Q 29.22 ac 7.85 or 27.80 hy 1.13 ab 25.15 mt 3.25 Z 5.12 il 0.15	Ampasibitika, Sakalave, Madagascar.	A. Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 235, 1903.	Aplite.	Veinlet in No. 9, II.4.1.4.

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. PANTELLERASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
33	64.01	13.96	7.31	0.20	0.21	1.02	5.30	5.10	1.38		1.66	0.08			100.23		
A2. II	1.067	.137	.046	.003	.005	.018	.085	.054			.021	.001					
34	71.56	11.94	4.68	0.46	0.32	0.28	4.88	5.03	0.40	0.33	0.17	trace	trace	NiO BaO SrO Li ₂ O	0.01 none none none	100.06	2.71
A2. II	1.193	.117	.029	.007	.008	.005	.088	.053			.002	—	—				
35	65.31	12.08	5.12	3.07	0.96	2.50	4.91	4.72	0.57	0.47	0.49	0.14	0.11		100.45	2.40	
A2. II	1.089	.118	.032	.043	.024	.045	.079	.050			.006	.001	.001				
36	64.13	14.32	5.58	0.70	0.72	2.36	5.29	4.86	0.79		0.65	0.39	0.12		99.91		
A2. II	1.069	.140	.035	.010	.018	.042	.085	.052			.008	.003	.002				

RANG 1. PERALKALIC. PANTELLERASE.

1	70.59	12.38	1.61	3.33	none	0.93	6.95	3.74	0.21	0.20	0.44	trace	0.08	Cl	none	100.46	2.657
A2. II	1.177	.122	.010	.046	—	.017	.112	.039			.005	—	.001				
2	73.01	11.23	2.53	3.66	0.02	0.75	5.56	3.66	0.55	none			0.19	S BaO SrO	0.05 0.06 0.01	101.28	
B2. III	1.217	.110	.015	.051	—	.013	.090	.039					.003				
3	71.35	12.21	4.53	1.14	trace	0.22	6.51	3.22	0.33		0.50		0.78			100.79	
A?3. III	1.189	.120	.028	.014	—	.004	.105	.034			.006		.011				
4	63.68	13.31	2.94	3.40	2.45	2.66	4.89	4.27	0.93		0.45	0.60	0.25			99.83	
A2. II	1.061	.130	.018	.047	.061	.047	.079	.045			.006	.004	.004				
5	66.73	12.23	1.49	3.25	1.49	3.25	6.14	2.53	0.62	0.05	0.32	0.22		FeS ₂	0.39	99.46	
A2. II	1.112	.120	.009	.045	.037	.058	.099	.027			.004	.002					
6	60.76	10.72	5.22	5.40	4.19	4.37	4.93	2.44	n. d.		2.14					100.17	
A3. III	1.013	.105	.033	.075	.105	.079	.079	.026			.027						
7	64.76	13.40	4.48	2.26	0.39	2.57	5.65	4.10	1.21		0.31	trace	0.31	SO ₂	trace	99.44	
A2. II	1.079	.131	.028	.032	.010	.046	.091	.044			.004	—	.004				
8	65.60	10.15	6.40	3.70	0.64	none	7.45	1.17	0.62		0.19		0.51	ZrO ₂	3.10	99.53	
A2. II	1.093	.100	.040	.051	.016	—	.120	.013			.002		.007				
9	63.70	9.78	9.01	7.85	0.45	1.36	3.98	2.36	0.75		0.30		0.12	ZrO ₂	0.50	100.84	
A2. II	1.062	.096	.058	.109	.011	.024	.065	.026			.004		.002				
10	70.76	10.16	7.00	0.63	0.49	0.65	5.53	2.57	0.88	0.57	0.49	none	0.16	ZrO ₂ Cl F S Cr-O ₂ BaO SrO	none 0.04 0.02 0.06 none 0.12 0.03	100.16	
A1. I	1.179	.100	.044	.009	.012	.012	.089	.028			.006	—	.002				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 3. SODIPOTASSIC. GRORUDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
33	(I)II.4(5).1.3(4).	Q 13.02 ac 0.92 or 30.02 di 1.08 ab 43.49 wo 1.16 il 0.46 hm 7.36 ru 1.44 ap 0.84	Chapelle, Cilaos, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 541, 1912.	Quartz syenite.	Iron oxides?
34	(I)II.4.1.3.	Q 22.92 ac 11.09 or 29.47 di 1.08 ab 33.54 hy 0.30 mt 1.16 il 0.30	Trachyte Range, Glass House Mountains, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 68, 1906.	Pantellerite.	
35	II.4.1.3".	Q 15.18 ac 5.08 or 27.80 di 9.65 ab 35.63 mt 4.87 il 0.91 ap 0.34	Cainbale Creek, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Trachyte.	H. C. Richards, pers. com.
36	(I)II.4(5).1.3(4).	Q 11.64 di 3.89 or 28.91 wo 1.28 ab 44.54 mt 0.93 an 0.83 il 1.22 hm 4.96 ap 1.01	Cape Adare, Victoria Land, Antarctic.	G. T. Prior.	G. T. Prior, Rep. S. Cross Exp. p. 329, 1902.	Phonolitic trachyte.	

SUBBRANG 4. DOSODIC. PANTELLEROSE. (C. I. P. W., 1902.)

1	(I)II.4.1."/4.	Q 19.68 ac 4.62 or 21.68 ns 2.32 ab 43.49 di 4.21 hy 3.17 il 0.76	Himausak, South Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 114, 1911.	Arfved- sonite granite.	
2	"II.4.1.(3)4.	Q 25.38 ac 7.39 or 21.68 ns 0.37 ab 37.20 di 3.23 hy 5.41	Sneech Pond, Cumberland River, Rhode Island.	J. H. Perry.	Emerson and Perry, U. S. G. S. B. 311, p. 66, 1907.	Riebeckite porphyry (palsanite).	
3	(I)II.4.1."/4.	Q 20.94 ac 8.78 or 21.68 di 0.99 ab 45.06 hy 0.79 mt 2.09 il 0.93	Kallerud, Laugendal, Norway.	L. and V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 48, 1894.	Grorudite.	MnO high? Probably in I.4.1.4. In W. T., p. 155.
4	II.4(5).1.(3)4.	Q 11.34 di 6.34 or 25.02 hy 6.38 ab 41.39 mt 4.13 an 1.67 il 0.91 ap 1.34	Björkstugan, Lapland.	T. Sundberg.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	
5	II.4"/.1.4.	Q 12.36 ac 2.77 or 15.01 di 11.85 ab 51.87 hy 2.78 mt 0.70 il 0.61 ap 0.67	Backofenberg, Hesse.	W. Sonne.	C. Chelius, Erl. G. Kte. Hesse, Bl. Breusbach, p. 24, 1897.	Granite.	In W. T., p. 221.
6	II"/.4"/.1.4.	Q 11.04 di 17.38 or 14.46 hy 4.26 ab 41.39 mt 7.66 il 4.10	Lausitz, Saxony.	H. Ivens.	H. Ivens, In. Diss. Erl., p. 9, 1910.	Granite.	
7	(I)II.4"/.1."/4.	Q 12.78 ac 1.85 or 24.46 di 4.15 ab 45.59 wo 3.25 mt 5.57 il 0.61	Aden, Arabia.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XXIV, p. 188, 1908.	Trachydacite.	
8	II.4.1.4(5).	Q 16.26 ac 15.25 or 7.23 hy 8.07 ab 45.59 mt 1.82 Z 4.58 il 0.30	Ampasibitika, Madagascar.	A. Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 235, 1903.	Arfvedsonite granite.	
9	II."/4.1.4.	Q 25.86 di 4.61 or 14.46 hy 5.42 ab 34.06 mt 12.99 an 1.39 il 0.61 Z 0.73	Ampasibitika, Madagascar.	A. Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 235, 1903.	Aegirite-rie- beckite granite.	
10	(I)II.(3)4.1.4.	Q 29.22 ac 7.85 or 15.57 di 2.59 ab 37.73 mt 1.16 il 0.91 hm 3.52	Manumea River, Timor Island.	E. W. Morley.	J. P. Iddings, pers. com.	Trachyte.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. PANTELLERASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
11	66.40	12.03	8.23	0.64	0.40	0.62	5.26	3.26	1.85	0.50	0.82	0.23	0.05	CO ₂ none	100.29	2.49
A2. II	1.107	.118	.051	.009	.010	.011	.085	.035			.010	.002	—			
12	60.00	10.58	6.18	4.72	1.97	2.88	6.58	2.20	1.65	0.65	1.56	0.44	0.18		99.59	2.69
A2. II	1.000	.104	.039	.065	.049	.052	.106	.023			.020	.003	.003			
13	67.60	12.29	3.15	4.88	1.08	2.90	5.67	2.16	0.15						99.88	
A3. III	1.127	.120	.020	.068	.027	.052	.092	.023								
14	66.02	11.83	2.08	2.88	0.95	1.03	8.88	3.73	1.07	1.21	0.61	trace	0.17	CO ₂ trace	100.46	2.48
A2. II	1.100	.116	.013	.040	.024	.018	.144	.039			.008	—	.002			
15	62.81	10.36	5.92	2.59	0.47	1.79	7.73	3.64	2.44	0.81	0.71	trace	0.11	CO ₂ 0.17	99.55	2.44
A2. II	1.047	.102	.037	.036	.012	.032	.124	.038			.009	—	.002			

RANG 1. PERALKALIC. PANTELLERASE.

1	68.07	15.07	1.13	3.42	2.27	0.73	6.06	0.29	1.25	0.01	0.37	trace	0.31	S 1.14	100.12	
A2. II	1.135	.148	.007	.047	.057	.013	.098	.003			.005	—	.004			
2	70.75	12.01	0.62	0.94	0.56	6.13	7.20	0.79	0.49	0.20	0.17	0.10	0.08	S BaO trace trace	100.44	
A2. II	1.179	.118	.004	.013	.014	.109	.116	.008			.002	.001	.001			

RANG 2. DOMALKALIC. DACASE. (C. I. P. W., 1902.)

1	63.25	10.37	2.77	2.71	9.92	1.24	1.55	4.90	4.03		0.34				101.08	2.696
B3. IV	1.054	.102	.017	.038	.245	.022	.025	.052			.004					
2	67.50	14.47	1.23	5.29	2.25	1.75	1.75	5.35	0.53		0.09		trace		100.21	
A3. III	1.125	.142	.008	.074	.056	.031	.028	.057			.001		—			
3	65.63	13.85	2.02	2.80	2.79	3.43	1.84	6.25	1.17		trace	trace	trace		99.77	2.864
A3. III	1.094	.136	.013	.039	.070	.060	.030	.067			—	—	—			

RANG 2. DOMALKALIC. DACASE.

1	64.52	15.58	2.13	2.18	2.32	3.88	3.70	4.02	0.67	0.22	0.80	0.34	0.05	Cl 0.10 S 0.03 Cr ₂ O ₃ none BaO 0.06 SrO trace	100.68	
A1. I	1.075	.153	.013	.031	.058	.070	.060	.042			.010	.002	—			
2	66.35	14.09	1.81	4.49	1.05	3.16	3.32	4.08	0.35		1.00	0.40	0.17	ZrO ₂ trace Cl 0.02 F 0.03 S 0.04 BaO 0.03	100.39	
A1. I	1.106	.138	.011	.063	.026	.056	.053	.044			.013	.003	.002			
3	64.47	10.51	1.11	7.37	5.21	3.10	2.21	3.63	0.75	0.18	0.65	0.25	0.15	CO ₂ 0.58 ZrO ₂ none S 0.12 NiO 0.04 BaO 0.04		
A1. I	1.075	.103	.007	.103	.130	.055	.035	.038			.008	.002	.002			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 4. DOSODIC. PANTELLEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
11	(I)II.4.1.4.	Q 22.56 ac 0.92 or 19.46 di 0.86 ab 43.49 hy 0.70 il 1.52 hm 7.84 ap 0.67	Esk, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Trachyte.	H. C. Richards, pers. com.
12	II''4(5).1.4.	Q 9.06 ac 11.55 or 12.79 di 9.61 ab 42.44 hy 4.94 mt 3.25 il 3.04 ap 1.01	Esk, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Trachyte.	H. C. Richards, pers. com.
13	II.4.1.4.⊙	Q 18.12 di 11.11 or 12.79 hy 3.38 ab 48.21 mt 4.64 an 1.39	Tewaeae Point, Otago, New Zealand.	L. J. Wild.	L. J. Wild, Tr. N. Z. Inst., XLIV, p. 327 (1911), 1912.	Porphyry.	
14	II.4.1.4.⊙	Q 13.32 ac 6.01 or 21.68 ns 6.59 ab 40.35 di 5.24 hy 4.74 il 1.22	Circular Head, Carney Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islds, p. 724, 1909.	Trachyte.	
15	II.4''1.(3)4.	Q 11.46 ac 17.09 or 21.13 ns 2.81 ab 33.54 di 7.65 hy 1.09 il 1.37	Musgrave Peninsula, Carney Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islds., p. 724, 1909.	Trachyte.	

SUBBRANG 5. PERSODIC.

1	(I)II.''4.1(2).5.	Q 25.50 hy 8.47 or 1.67 mt 1.62 ab 51.35 il 0.76 an 3.61 pr 2.15 C 3.47	Seminole Mine, Lincoln County, Georgia.	E. Everhardt.	S. P. Jones, Ga. G. S. B. 19, p. 56, 1909.	Quartz albite porphyry.	Altered?
2	''II.4.1.''5.	Q 19.26 ac 1.85 or 4.45 ns 0.24 ab 57.64 di 6.00 wo 9.28 il 0.30 ap 0.34	Svartsberg, North Ulön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 163, 1913.	Micropeg- matite.	

SUBBRANG 2. DOPOTASSIC.

1	II''4.2.2''.	Q 16.98 hy 27.04 or 28.91 mt 3.94 ab 13.10 il 0.62 an 6.12 C 0.31	Gierniger Loch, Baden.	M. Dittrich.	F. Schalch, Sp. Kte. Bad., Bl. Petersthal, p. 33, 1895.	Quartz- mica syenite.	Border of No. 159, I.4.1.3. In W. T., p. 223.
2	''II.''4.2.2''.	Q 25.92 hy 14.08 or 31.69 mt 1.86 ab 14.67 il 0.15 an 8.62 C 2.65	Wolfsklippen, Brocken, Hartz.	O. Dreibrodt.	O. Dreibrodt, In. Diss. Leip., 1912.	Dicpside granite.	
3	''II.4.2.2.	Q 18.84 di 4.51 or 37.25 hy 8.50 ab 15.72 mt 3.02 an 10.84	Follmersdorf, Silesta.	H. Traube.	H. Traube, N. J., 1890, I, p. 212.	Hornblende syenite.	In W. T., p. 223.

SUBBRANG 3. SODIPOTASSIC. ADAMELLOSE. (C. I. P. W., 1902.)

1	(I)II.4.2''3''.	Q 16.98 di 2.65 or 23.35 hy 5.59 ab 31.44 mt 3.02 an 14.18 il 1.52 ap 0.67	Rocky Islet Bay, Rainy Lake, Ontario.	M. F. Connor.	A. C. Lawson, Can. G. S. Mem. 40, p. 91, 1913.	Syenite.	
2	(I)II.4.2.3.	Q 22.20 di 1.18 or 24.46 hy 7.42 ab 27.77 mt 2.55 an 11.40 il 1.98 ap 1.01	Northville, Fulton County, New York.	E. W. Morley.	W. J. Miller, N. Y. St. Mus. B. 153, p. 15, 1911.	Quartz syenite.	
3	II.4.2.3.⊙	Q 20.34 di 4.11 or 21.13 hy 22.86 ab 18.34 mt 1.62 an 8.34 il 1.22 ap 0.67	Fort Ann, Washington County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. B. 228, p. 46, 1904.	Syenite.	In W. T., p. 223.

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
4	61.01	15.36	2.98	7.77	0.78	4.05	3.68	3.90	0.49				.008		100.10	
A3. III	1.017	.150	.019	.108	.020	.072	.060	.041					.001			
5	63.40	15.94	2.01	3.91	1.33	3.75	3.53	3.30	0.76	0.06	1.33	0.55	0.05	CO ₂ trace	99.94	2.82
A2. II	1.057	.156	.013	.054	.033	.067	.056	.035			.017	.004	—			
6	62.35	13.24	3.52	6.33	0.85	3.34	2.79	3.95	1.21	0.11	1.18	0.57	0.08	Cr ₂ O ₃ none NiO none BaO 0.16 SrO trace Li ₂ O trace	99.68	
A1. I	1.039	.130	.022	.088	.021	.059	.054	.042			.014	.004	.001			
7	57.98	13.58	3.11	8.68	2.87	2.01	3.56	3.44	2.47		1.75	0.29	0.13	BaO 0.04 SrO trace Li ₂ O trace	99.91	
A1. I	.966	.134	.020	.121	.072	.036	.057	.036			.022	.002	.002			
8	64.49	15.49	1.28	2.71	1.89	4.32	3.53	4.04	0.48	0.16	0.56	0.19	0.07	CO ₂ 0.49 S 0.07 BaO 0.06	99.83	2.714
A1. I	1.075	.152	.008	.038	.047	.077	.056	.042			.007	.001	.001			
9	62.18	15.77	1.83	2.44	3.55	4.13	3.92	3.91	0.70	0.30	0.55	0.32	trace	SO ₃ trace Cl 0.04 BaO 0.43 SrO 0.16	100.23	
A1. I	1.036	.154	.011	.033	.089	.073	.063	.041			.007	.002	—			
10	59.24	13.84	5.46	1.36	4.79	5.60	3.13	4.22	2.02		0.22	0.34	trace	CO ₂ none SO ₃ 0.08 Cl 0.04 BaO trace SrO none	100.34	
A1. I	.987	.136	.034	.019	.120	.100	.050	.045			.003	.002	—			
11	63.97	15.78	2.35	1.87	2.84	3.71	4.36	4.01	0.49	0.09	0.48	0.40	0.05	NiO trace	100.40	
A2. II	1.066	.155	.015	.026	.071	.066	.070	.042			.006	.003	—			
12	63.05	15.58	2.92	2.11	1.70	4.15	3.77	3.66	1.38	0.55	0.60	0.27	0.12	BaO 0.13 SrO 0.07 Li ₂ O trace	100.06	
A1. I	1.051	.153	.018	.030	.043	.074	.061	.039			.007	.002	.002			
13	62.36	14.95	5.15	0.89	1.82	3.88	3.59	3.74	0.85	1.52	0.69	0.31	0.09	CO ₂ 0.10 ZrO ₂ none S 0.01 Cr ₂ O ₃ none V ₂ O ₅ 0.02 BaO 0.08 SrO 0.07	100.12	
A1. I	1.039	.147	.032	.013	.046	.070	.068	.039			.009	.002	.001			
14	60.25	15.55	5.95	0.53	2.91	4.93	3.41	4.39	0.46	0.20	0.51	0.61	0.09	CO ₂ none ZrO ₂ 0.04 F 0.04 S 0.02 Cr ₂ O ₃ trace V ₂ O ₅ 0.02 NiO none BaO 0.13 SrO 0.05	100.09	
A1. I	1.004	.152	.038	.007	.073	.058	.055	.047			.006	.004	.001			
15	65.29	11.57	2.10	2.67	2.87	4.85	2.10	5.18	1.82	0.50		0.22		BaO 0.17	99.34	
B3. IV	1.088	.113	.013	.038	.072	.087	.034	.055				.002				
16	62.84	14.21	0.91	3.75	3.04	4.72	2.85	4.60	1.23	0.26	0.42	0.41	0.06	CO ₂ 0.38 ZrO ₂ trace S 0.01 BaO 0.03	99.72	
A1. I	1.047	.139	.006	.052	.076	.084	.046	.049			.005	.003	.001			
17	69.41	12.83	1.06	2.48	0.71	4.73	3.13	5.25	0.18	0.11	0.20		0.12		100.21	
A2. II	1.157	.126	.007	.035	.018	.084	.050	.056			.003		.002			
18	64.34	13.80	1.31	3.30	3.61	2.98	3.50	5.57	1.64		0.43				100.48	
A3. III	1.072	.135	.008	.046	.090	.054	.056	.060			.005					

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. ADAMELLOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
4	II.4(5).2''.3''.	Q 10.86 di 5.58 or 22.80 hy 10.84 ab 31.44 mt 4.41 an 13.62	Altamont, Franklin County, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R. LIV, p. R 69, (1900), 1902.	Augite syenite.	Iron oxides as in op. cit. LX, p. 514, 1907.
5	(I)II.4.2(3).3(4).	Q 20.76 hy 6.47 or 19.46 mt 3.02 ab 29.34 il 2.53 an 15.01 sp 1.34 C 1.12	Colleen, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 63, 1913.	Quartz monzonite gneiss.	
6	''II.4.2''.3.	Q 21.24 di 0.71 or 23.35 hy 8.73 ab 23.58 mt 5.10 an 11.95 il 2.13 ap 1.34	Near Barmer's Elk, Watauga County, North Carolina.	H. N. Stokes.	A. Keith, U. S. G. S. B. 168, p. 52, 1900.	Rhyolite.	In W. T., p. 223.
7	II.4''.2.3(4).	Q 11.82 hy 17.76 or 20.02 mt 4.64 ab 29.87 il 3.34 an 8.06 ap 0.67 C 1.22	Pigeon Point, Minnesota.	W. F. Hille- brand.	W. S. Bayley, A. J. S., XXXVII, p. 61, 1889.	Quartz diorite.	Also in U.S.G.S. B. 109, p. 63, 1893. In W. T., p. 223.
8	(I)II.4.2''.3.	Q 17.28 di 4.54 or 23.35 hy 5.64 ab 29.34 mt 1.86 an 15.01 il 1.06 ap 0.34	Clancy, Montana.	J. G. Fairchild.	A. Knopf, U. S. G. S. rec. lab.	Quartz monzonite.	"Fresh."
9	''II.4(5).2''.3(4).	Q 11.58 di 3.52 or 22.40 hy 0.08 ab 33.01 mt 2.55 an 13.90 il 1.06 ap 0.67	Steamboat Moun- tain, Little Belt Mountains, Montana.	W. F. Hille- brand.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 517, 1900.	Diorite porphyry.	In W. T., p. 223.
10	II.4(5).2.3.	Q 9.54 di 11.45 or 25.02 hy 7.00 ab 26.20 mt 3.71 an 11.40 il 0.46 hm 2.88 ap 0.67	N. fork of Willow Creek, Highwood Mountains, Montana.	Hurlbut and Barnes.	Weed and Pirsson, U. S. G. S. B. 237, p. 164, 1905.	Trachy- andesite.	In W. T., p. 223.
11	(I)II.4''.2.3(4).	Q 13.14 di 2.94 or 23.35 hy 6.43 ab 36.68 mt 3.48 an 11.95 il 0.91	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	W. Melville.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 261, 1899.	Quartz diorite.	In W. T., p. 223.
12	(I)II.4.2''.3(4).	Q 16.98 di 3.09 or 21.68 hy 3.76 ab 31.96 mt 4.18 an 14.73 il 1.06 ap 0.67	Cliff Creek, West Elk Moun- tains, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 14, (II), p. 227, 1894.	Porphyrite.	In W. T., p. 223.
13	(I)II.4.2''.3(4).	Q 17.88 di 2.81 or 21.68 hy 3.30 ab 30.39 mt 1.16 an 13.90 il 1.37 hm 4.32 ap 0.67	Mineral Creek, San Cristobal quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. rec. lab.	Quartz latite.	
14	II.4(5).2''.3.	Q 11.64 di 5.40 or 26.13 hy 4.80 ab 28.82 mt 0.46 an 13.90 il 0.91 hm 5.76 ap 1.34	Cascade Gulch, San Cristobal quadrangle, Colorado.	C. Palmer.	W. Cross, U. S. G. S. rec. lab.	Quartz latite.	
15	II.4.2.(2)3.	Q 21.18 di 12.58 or 30.58 hy 4.42 ab 17.82 mt 3.02 an 6.67 ap 0.67	Granite Mountains, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 338, p. 49, 1908.	Andesite.	
16	II.4''.2''.3.	Q 14.46 di 6.83 or 27.24 hy 9.79 ab 24.10 mt 1.39 an 12.23 il 0.76 ap 1.01	Clifton District, Utah.	R. C. Wells.	E. S. Butler, U. S. G. S. rec. lab.	Monzonite.	
17	(I)II.4''.2.3.	Q 22.32 di 10.58 or 31.14 wo 2.20 ab 26.20 mt 1.62 an 5.56 il 0.46	Sao Antonio, Rio Madeira, Amazonas, Brazil.	G. S. Blake.	J. W. Evans, Q. J. G. S. LXII, p. 119, 1906.	Granite.	
18	II.4.5).(1)2.3.	Q 10.80 di 7.85 or 33.36 hy 9.67 ab 29.34 mt 1.86 an 5.28 il 0.76	Talhorn, Vogesen.	K. Weyberg.	K. Weyberg, Warsch. Un. Nachr., 1909.	Syenite porphyry.	Osann, III, (I), p. 106.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
19	63.51	14.31	2.08	3.70	4.90	2.60	2.90	3.80	1.64		0.55		0.04		100.03	
A2. II	1.059	.140	.013	.051	.123	.046	.047	.040			.007		—			
20	63.20	17.15	0.20	3.72	3.32	3.06	3.17	4.21	0.60		0.95	0.19			99.77	
A2. II	1.053	.168	.001	.051	.083	.055	.052	.044			.016	.001			(100.58)	
21	63.0	14.9	0.4	4.3	4.5	0.9	3.1	4.5	2.6		1.5	trace			99.7	
B3. IV	1.050	.146	.003	.060	.113	.016	.050	.048			.019	—				
22	59.87	17.57	4.01	0.87	5.42	2.20	2.40	5.50	3.07						100.91	
B3. IV	.998	.172	.025	.013	.133	.039	.039	.059								
23	74.10	11.64	2.62	n. d.	2.81	2.28	2.90	3.81	0.75						100.91	
A4. IV	1.235	.114	.016	(.032)	.070	.041	.047	.040								
24	69.19	11.86	1.22	4.72	2.02	2.45	3.80	3.57	0.60	0.36	0.54	0.10	0.08	S BaO	0.02 trace	100.53
A2. II	1.153	.116	.008	.065	.050	.044	.061	.038			.007	.001	.001			
25	68.97	14.30	3.80	0.68	0.88	2.41	3.72	3.85	0.57		0.34		0.45		99.97	
A2. II	1.150	.140	.024	.010	.022	.043	.060	.041			.004		.006			
26	67.31	13.26	5.46	1.32	1.08	3.57	3.09	3.17	0.43		0.51		0.21		99.71	
A2. II	1.122	.130	.034	.018	.027	.064	.050	.034			.010		.003			
27	63.47	15.01	2.70	3.01	2.18	3.91	3.70	3.39	0.87		0.88		0.47		99.59	
A2. II	1.058	.147	.017	.042	.055	.070	.060	.036			.011		.007			
28	62.02	11.76	5.71	2.87	2.79	4.09	3.65	3.71	1.32		1.80	0.61	trace		100.33	
A2. II	1.034	.115	.036	.040	.070	.073	.059	.039			.023	.004	—			
29	61.67	13.70	3.91	4.61	1.72	4.33	3.02	4.37	0.40		1.38	0.44	0.20		99.75	
A2. II	1.028	.134	.024	.064	.043	.077	.048	.047			.017	.003	.003			
30	60.16	13.18	8.88	3.15	1.03	3.89	3.42	3.53	1.90		0.20	trace	0.22		99.56	
A2. II	1.003	.129	.055	.044	.026	.070	.055	.037			.003	—	.003			
31	64.49	13.67	1.63	4.42	1.38	3.12	3.57	4.40	1.11	0.46	1.22	0.58	0.14		100.19	
A2. II	1.075	.134	.010	.061	.035	.055	.058	.047			.015	.004	.002			
32	63.57	14.69	1.79	3.11	2.82	3.84	4.26	4.07	0.95		0.55	0.24			99.89	
A2. II	1.000	.144	.011	.043	.071	.069	.069	.043			.007	.002				
33	63.70	15.53	1.77	1.52	2.02	4.11	4.35	4.00	0.71	0.07	1.09	0.24		CO ₂ SO ₂	0.83 0.26	100.25
A2. II	1.062	.152	.011	.021	.051	.073	.070	.042			.014	.002				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 3. SODIPOTASSIC. ADAMELLOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
19	II.4.2''3.	Q 17.46 hy 16.39 or 22.24 mt 3.02 ab 24.63 il 1.06 an 12.79 C 0.71	Haut du Faite, Vogesien.	K. Weyberg.	K. Weyberg, Warsch. Ün. Nachr., 1909.	Granite.	Osann, III, (I), p. 1.
20	"II.4''2(3).3.	Q 15.12 hy 13.32 or 24.46 mt 0.23 ab 27.25 il 1.82 an 14.46 ap 0.34 C 2.04	Moulin de Tabourette, Lyonnais, France.	Pisani.	A. Michel-Levy, C. R., CLVI, p. 718, 1913.	Granite.	
21	II.4.(1)2.3.	Q 16.74 hy 16.32 or 26.69 mt 0.70 ab 26.20 il 2.89 an 4.45 C 3.26	Tabor, Mount Pelvoux, Dauphiny, France.	Lassieur.	P. Termier, B. Soc. Min. Fr., XXXIV, p. 46, 1911.	Mica trachyte.	
22	"II.4(5).2.(2)3.	Q 11.94 hy 13.30 or 32.80 mt 3.02 ab 20.44 hm 1.92 an 10.84 C 3.57	Locality?, Northwest Corsica.	J. Deprat.	J. Deprat, B. Serv. Ct. G. Fr., XVII, No. 117, p. 55, 1907.	Trachyan- desite.	
23	(I)II.(3)4.2.3.	Q 32.58 di 3.16 or 22.24 hy 9.70 ab 24.63 an 7.61	Scheerenberg, New Amsterdam Island, Spitzbergen.	Peiser.	D. L. Bryant, In. Diss. Erl., p. 12, 1905.	Granite.	
24	"II.4.(1)2.3(4).	Q 24.00 di 5.56 or 21.13 hy 8.95 ab 31.96 mt 1.86 an 4.73 il 1.06 ap 0.34	Svartsbergvik, N. Ulön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 126, 1913.	Adamellite.	
25	II''4.2.3''.	Q 26.40 di 0.86 or 22.80 hy 1.80 ab 31.44 mt 2.78 an 10.84 il 0.61 hm 1.92	Stangsmala, Eringsboda, Blekinge, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
26	(I)II.''4.2''3(4).	Q 28.86 di 3.89 or 18.90 hy 0.90 ab 26.20 mt 2.55 an 12.79 il 1.52 hm 3.68	Bräunemosse, Kalmar, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
27	"II.4.2(3).3(4).	Q 17.10 di 4.26 or 20.02 hy 6.21 ab 31.44 mt 3.94 an 14.18 il 1.67	Smedsemm, Oskarshamn, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
28	II.4.''2.3(4).	Q 17.94 di 9.23 or 21.68 hy 2.70 ab 30.92 mt 3.94 an 4.73 il 3.50 hm 2.89 ap 1.34	Amal, Dalsland, Sweden.	O. Berg.	P. J. Holmquist, B. Un. Ups., VII, p. 264, 1906.	Granite.	
29	II.4.2.3.⊙	Q 16.98 di 6.40 or 26.13 hy 4.58 ab 25.15 mt 5.57 an 10.84 il 2.58 ap 1.01	Beden, Villie, Skane, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	
30	II.4.2.3(4).	Q 19.08 di 5.62 or 20.57 hy 0.81 ab 28.82 mt 10.21 an 10.29 il 0.46 hm 1.76	Svärdfall, Brefven, Sweden.	K. Winge.	K. Winge, G. F. F., XVIII, p. 195, 1896.	(Monzonite.)	"Intermediate rock." In W. T., p. 223.
31	(I)II.4.2.3.	Q 18.06 di 3.03 or 26.13 hy 6.99 ab 30.39 mt 2.32 an 8.06 il 2.28 ap 1.34	Knudsbakke, Bornholm Island, Denmark.	M. Dittrich.	C. Kalb, In. Diss. Greif., p. 35, 1914.	Granite.	L. Milch, pers. com.
32	"II.4(5).2.3(4).	Q 11.88 di 6.74 or 23.91 hy 7.14 ab 36.15 mt 2.55 an 8.90 il 1.06 ap 0.67	Heiligkreutz, Neckarthal, Baden.	M. Dittrich.	M. Dittrich, Mt. Bad. G. L.-A., IV (2), p. 202, 1901.	Granite.	
33	(I)II.4(5).2.3(4).	Q 13.98 di 5.62 or 23.35 hy 2.50 ab 36.68 mt 1.62 an 11.12 il 2.13 hm 0.64 ap 0.67	Hühnerbusch, n. Rossdorf, Hesse.	Stadler.	G. Klemm, Erl. G. Kte. Hes., Bl. Rossdorf, p. 58, 1912.	Granite porphyry.	Fresh?

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
34	65.61	14.91	0.94	4.47	1.41	2.07	3.02	5.44	1.57		0.21	0.25		SO ₂ 0.18	100.08	
A2. II	1.094	.146	.006	.063	.035	.038	.048	.057			.003	.002				
35	65.17	14.60	1.39	4.79	1.45	1.86	3.29	3.99	2.21		0.32	0.41		SO ₂ 0.37	99.85	2.664
A2. II	1.086	.143	.009	.067	.036	.033	.053	.043			.004	.003				
36	64.71	12.82	2.85	7.71	1.46	2.04	2.59	3.52	1.63		1.02	0.32	0.18	SO ₂ 0.13	100.98	
B2. III	1.079	.126	.018	.107	.037	.037	.042	.037			.013	.002	.003			
37	63.45	13.29	3.11	5.78	1.37	3.04	2.95	3.43	1.36		1.03	0.19	0.15	CO ₂ S 0.14 0.06	99.35	
B2. III	1.058	.130	.019	.081	.034	.054	.048	.036			.013	.001	.002			
38	60.11	15.93	2.04	6.66	1.22	3.25	3.65	4.18	1.78		0.82	0.37		SO ₂ 0.27	100.28	2.809
A2. II	1.002	.156	.013	.093	.031	.058	.059	.044				.003				
39	64.73	14.92	3.91	2.41	0.47	3.25	4.20	4.47	0.64		0.64	0.23	trace	CO ₂ 0.08	99.95	2.656
A2. II	1.079	.146	.024	.033	.012	.058	.068	.048			.008	.002	—			
40	66.75	13.44	2.96	4.98	1.10	1.77	3.45	4.30	1.39		0.23	0.35			100.72	
A2. II	1.113	.132	.019	.069	.028	.032	.056	.045			.003	.002				
41	62.51	12.78	2.56	4.76	3.33	4.76	2.71	4.81	1.53		0.81	trace	trace		100.59	2.901
A2. II	1.042	.125	.016	.066	.083	.085	.043	.051			.010	—	—			
42	67.94	14.86	1.60	3.62	1.91	2.02	2.52	4.01	1.57						100.05	
A3. III	1.132	.146	.010	.050	.048	.036	.040	.042								
43	67.04	13.92	1.26	1.97	2.19	3.10	3.01	6.23	0.56	0.11	0.77	0.25			100.41	2.71
A2. II	1.117	.136	.008	.027	.055	.055	.048	.066			.010	.002				
44	66.56	13.29	0.88	4.16	1.78	3.37	3.08	4.36	1.34	0.09	0.80				99.71	2.77
A3. III	1.109	.130	.006	.058	.045	.061	.050	.047			.010					
45	65.89	16.70	0.94	2.43	1.00	3.65	3.07	3.87	1.48	0.03	0.47	1.05	0.04		100.62	2.71
A2. II	1.098	.164	.006	.033	.025	.065	.050	.041			.006	.007	—			
46	66.86	12.83	4.21	1.86	2.06	3.80	2.70	5.19	0.25			0.19			99.95	
A3. III	1.114	.126	.026	.026	.052	.068	.044	.055				.001				
47	65.02	15.23	1.01	3.12	1.84	2.88	2.92	6.09	2.15		trace	0.05			100.31	
A3. III	1.084	.149	.006	.043	.046	.051	.047	.065			—	—				
48	68.52	15.03	0.19	3.21	1.14	3.16	4.23	4.85	n. d.		0.15		0.31		100.79	
A3. III	1.142	.147	.001	.044	.029	.056	.068	.052			.002		.004			
49	64.03	12.77	1.92	5.44	0.65	3.42	2.91	4.30	2.25	0.39	1.30	0.40			99.78	
A2. II	1.067	.125	.012	.075	.016	.061	.047	.046			.016	.003				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 3. SODIPOTASSIC. ADAMELLOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
34	(I)II.4.2.3.	Q 18.98 hy 10.63 or 31.69 mt 1.39 ab 25.15 il 0.46 an 8.62 ap 0.67 C 1.02	Wolfsklippen, Brocken, Harz.	G. Klüss.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXXII (2), p. 353, 1912.	Schliere in granite.	Cf. No. 265, I.4.2.3.
35	(I)II.4.2.3.	Q 22.44 hy 10.73 or 23.91 mt 2.09 ab 27.77 il 0.61 an 6.39 ap 1.01 C 2.45	Meineckenberg, Ilsethal, Brocken, Harz.	K. Hampe.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 347, 1906.	Granite.	
36	II."4.2.3.	Q 25.74 hy 14.13 or 20.57 mt 4.18 ab 22.01 il 1.98 an 8.34 ap 0.67 C 1.73	Kleine Birken- kopf, Brocken, Harz.	Schade.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 348, 1906.	Granite.	
37	"II.4.2(3).3".	Q 22.32 di 1.18 or 20.02 hy 9.54 ab 25.15 mt 4.41 an 12.79 il 1.98 ap 0.34	Ilsethal, Brocken, Harz.	Jacobs.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 347, 1906.	Granite.	
38	"II.4(5).2".3".	Q 11.22 hy 12.34 or 24.46 mt 3.02 ab 30.92 il 1.52 an 13.34 ap 1.01 C 0.51	Meineckenberg, Ilsethal, Brocken, Harz.	Klüss.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 349, 1906.	Granite.	
39	(I)II.4.2.3".	Q 17.34 di 2.84 or 26.69 wo 0.93 ab 35.63 mt 5.57 an 8.34 il 1.22 ap 0.67	Breiterberg, Lüptitz, Saxony.	C. Ambronn.	C. Ambronn, In. Diss. Leip., p. 27, 1907.	Pyroxene- quartz porphyry.	
40	(I)II.4.2.3.	Q 22.92 hy 9.00 or 25.02 mt 4.41 ab 29.34 il 0.46 an 6.95 ap 0.67 C 0.71	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 26, 1909.	Granite.	
41	II.4.2.3.⊙	Q 14.34 di 12.24 or 28.36 hy 7.60 ab 22.53 mt 3.71 an 8.62 il 1.52	Reichenstein, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 206.	Syenite.	In W. T., p. 225.
42	(I)II.(3)4.2.3.	Q 28.80 hy 10.08 or 23.35 mt 2.32 ab 20.96 an 10.01 C 2.86	Raffernertobel, n. Meran, Tyrol.	M. Dittrich.	E. Künzli, T. M. P. M., XVIII, p. 418, 1899.	Granitite gneiss.	In W. T., p. 225.
43	(I)II.4."2."3.	Q 17.94 di 5.75 or 36.70 hy 3.96 ab 25.15 mt 1.86 an 6.12 il 1.52 ap 0.67	Hälsistock, Graubünden, Switzerland.	L. Hezner.	F. Weber, U. Grubenmann, pers. com.	Syenite.	
44	"II.4.2.3.	Q 20.82 di 6.47 or 26.13 hy 6.83 ab 26.20 mt 1.39 an 9.17 il 1.52	Pontresina, Bernina region, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Banatite.	
45	(I)II.4.2."3.	Q 25.32 hy 5.27 or 22.80 mt 1.39 ab 26.20 il 0.91 an 11.68 ap 2.35 C 3.16	Pontresina, Bernina region, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Banatite.	
46	"II.4.2.3.	Q 22.56 di 8.21 or 30.58 hy 1.40 ab 23.06 mt 6.03 an 7.51 ap 0.34	Ponte Volpara, Bagnaia, Monte Cimino, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 507, 1912.	"Peperino" (biotite latite).	
47	(I)II.4.2."3.	Q 14.46 di 3.22 or 36.14 hy 7.89 ab 24.63 mt 1.39 an 10.29	Monte Amiata, Tuscany, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. Ital., XVIII, 1888.	Trachyte (toscanite).	In W. T., p. 225.
48	(I)II.4".2.3".	Q 15.90 di 6.84 or 28.91 hy 5.36 ab 35.63 mt 0.23 an 7.51 il 0.30	Cumpana Mare, Arges Valley, Rumania.	W. T. Saidel.	M. Reinhard, In. Diss. Zür., p. 90, 1906.	Aplite.	Border of dike. Cf. No. 235, I.4.1.3.
49	"II.4.2.3.	Q 21.78 di 4.55 or 25.58 hy 5.46 ab 24.63 mt 2.78 an 8.90 il 2.43 ap 1.01	Ranomainty, Sakelave region, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 18, 1913.	Olivine rhyolite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
50	67.20	14.64	0.97	3.34	1.97	2.04	3.69	5.70	0.34					Cr ₂ O ₃ 0.10	99.99	
A3. III	1.120	.144	.006	.046	.049	.037	.060	.061								
51	61.45	14.36	2.75	4.61	2.73	4.34	3.98	3.75	0.87		1.37				100.21	
A3. III	1.024	.141	.017	.064	.068	.077	.064	.040			.017					
52	62.84	15.29	4.93	2.87	2.24	3.68	3.50	3.22	1.05				0.17		99.79	2.737
A3. III	1.047	.150	.031	.040	.056	.066	.056	.034				.002				
53	69.38	12.56	2.40	2.25	1.47	3.72	2.77	3.75	1.05	0.09	0.52	0.12	0.04	CO ₂ 0.01 ZrO ₂ none Cl, F none SO ₃ S none Cr ₂ O ₃ none NiO none BaO 0.10 SrO trace Li ₂ O trace	100.23	2.710
A1. I	1.156	.123	.015	.032	.037	.066	.045	.040			.007	.001	—			
54	69.24	12.88	0.20	4.05	2.21	3.10	2.94	3.66	0.80	0.06	0.55	0.23	0.06	CO ₂ 0.04 ZrO ₂ none Cl, F none SO ₃ S none Cr ₂ O ₃ none NiO none BaO 0.04 SrO trace	100.06	2.705
A1. I	1.154	.126	.001	.057	.055	.055	.047	.039			.007	.002	.001			
55	67.24	14.20	1.50	2.88	1.39	3.24	3.98	4.07	0.50	0.12	0.65	0.11	0.06	CO ₂ 0.06 ZrO ₂ none Cl trace F none SO ₃ S none Cr ₂ O ₃ none NiO none BaO 0.07 SrO trace V ₂ O ₅ none	100.07	2.711
A1. I	1.121	.139	.009	.040	.035	.058	.065	.044			.008	.001	.001			
56	57.62	13.63	5.41	5.15	2.86	5.57	3.38	3.07	1.54	none	1.75	0.40	0.26		100.64	2.64
A2. II	.960	.134	.034	.072	.072	.100	.055	.033			.022	.003	.004			
57	62.09	14.45	3.46	4.00	0.94	3.15	4.45	4.56	0.34	0.24	1.30	0.56	0.38	CO ₂ 0.11 ZrO ₂ trace Cl 0.05 S 0.05 Cr ₂ O ₃ none NiO 0.09 BaO trace SrO none Li ₂ O none	100.22	2.70
A1. I	1.035	.142	.022	.056	.024	.056	.072	.049			.016	.004	* .005			
58	60.00	16.26	5.72	3.52	1.05	3.30	4.08	4.17	2.64						100.74	
A3. III	1.000	.160	.036	.049	.026	.059	.066	.045								

RANG 2. DOMALKALIC. DACASE.

1	68.95	12.74	0.46	5.15	1.57	1.72	3.80	3.28	1.50		0.43	0.20	0.13	BaO trace	99.93	2.694
A2. II	1.149	.125	.003	.072	.039	.030	.061	.030			.005	.001	.002			
2	60.05	11.88	3.22	10.21	0.85	4.76	4.04	2.10	0.66	0.21	1.74	0.52	0.28		100.52	2.872
A2. II	1.001	.117	.020	.142	.021	.085	.065	.022			.022	.004	.004			
3	61.66	17.31	1.56	5.94	2.44	2.38	4.41	1.89	0.53	0.06	1.47	none	0.18	S trace	99.83	
A2. II	1.028	.170	.010	.082	.061	.043	.071	.020			.018	—	.003			
4	63.04	14.30	1.25	6.12	1.75	4.38	3.57	3.17	0.72	0.05	1.43	0.28	0.09	S 0.04	100.19	
A2. II	1.051	.140	.008	.085	.044	.079	.058	.034			.018	.002	.001			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. SODIOPOTASSIC. ADAMELLOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
50	(I)II.4''."2.3.	Q 14.70 di 3.22 or 33.92 hy 8.59 ab 31.44 mt 1.39 an 6.39	Tatarka River, Jenissei District, Siberia.	(?)	A. Meister, Reg. Aurif. Sib., IX, p. 138, 1910.	Granite.	
51	II.4''."2.3(4).	Q 11.28 di 9.02 or 22.24 hy 6.38 ab 33.54 mt 3.94 an 10.29 il 2.58	Arka Tag, Lat. 36° 30' N., Lon. 80° E., Tibet.	H. Bäckström.	H. Bäckström, Peterm. Mt. Erg. Hft., No. 131, p. 376, 1900.	Bronzite. andesite.	In W. T., p. 225.
52	(I)II.4.2(3).3(4).	Q 18.84 di 1.33 or 18.90 hy 6.42 ab 23.34 mt 7.19 an 16.68	Gunung Bessie, Sumatra.	L. Serrurier.	R. D. M. Verbeek, Sum. Westk., p. 232, 1883.	Granite.	Not in W. T.
53	(I)II."4.2.3.	Q 23.70 di 5.56 or 22.24 hy 2.36 ab 23.58 mt 3.48 an 10.56 il 1.06 ap 0.34	Braidwood, New South Wales.	Not stated.	A. R. Dep. Mines N. S. W. (1909), p. 198, 1910.	Granite.	
54	(I)II."4.2''."3.	Q 26.70 di 1.86 or 21.68 hy 11.17 ab 24.63 mt 0.23 an 11.12 il 1.06 ap 0.67	Barren Jack, Yass, New South Wales.	Not stated.	A. R. Dep. Mines N. S. W. (1907), p. 185, 1908.	Hypersthene- quartz porphyry.	
55	(I)II.4.2.3(4).	Q 19.38 di 5.72 or 21.46 hy 3.85 ab 34.06 mt 2.09 an 8.34 il 1.22 ap 0.34	Amosfield, New South Wales.	H. P. White.	J. E. Carne, G. S. N. S. W. Min. Res. No. 14, p. 84, 1911.	Granite.	
56	II.4(5).2''."3(4).	Q 12.48 di 9.76 or 18.35 hy 4.66 ab 28.82 mt 7.89 an 24.10 il 3.34 ap 1.01	Tamborrie Plateau, Queensland.	G. R. Patten.	A. R. Agric, Chem. Qld., 1914.	Andesite.	H. C. Richards, pers. com.
57	"II.4(5).(1)2."3.	Q 11.88 di 5.10 or 27.24 hy 2.88 ab 37.73 mt 5.10 an 5.84 il 2.43 ap 1.34	Mount Cooroy, East Moreton District, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 168, 1906.	Monzonite.	
58	(I)II.4(5).2.3''.	Q 11.22 di 2.26 or 25.02 hy 3.22 ab 34.58 mt 8.35 an 13.62	Au Koraki, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 402, 1906.	Trachytoid phonolite.	

SUBRANG 4. DOSODIC. DACOSE. (C. I. P. W., 1902.)

1	(I)II.4.2.(3)4.	Q 24.84 hy 12.61 or 19.46 mt 0.70 ab 31.96 il 0.76 an 7.51 ap 0.34 C 0.20	Fairbank Lake, Sudbury, Ontario.	E. G. R. Ardagh.	A. P. Coleman, J. G., XV, p. 770, 1907.	Micropeg- matite (granite).	
2	II.4.2.4.⊙	Q 15.12 di 10.08 or 12.23 hy 10.51 ab 34.06 mt 4.64 an 8.34 il 3.34 ap 1.34	Homestead, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 121, 1908.	Quartz diabase.	Also in A. J. S., XXVI, p. 158, 1908.
3	II.4.2''."4.	Q 16.68 hy 13.62 or 11.12 mt 2.32 ab 37.20 il 2.74 an 11.95 C 3.77	Consolidated Mine, Dahlonega, Georgia.	E. Everhardt.	S. P. Jones, Ga. G. S. B. 19, p. 75, 1909.	Granite.	Sheared.
4	II.4.2''."(3)4.	Q 16.50 di 5.63 or 18.90 hy 9.47 ab 30.39 mt 1.86 an 13.34 il 2.74 ap 0.67	Cold Spring, Oklahoma.	J. G. Fairchild.	C. H. Taylor, U. S. G. S. rec. lab.	Granite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5	65.06	14.71	2.82	1.31	2.48	3.43	3.86	3.48	1.10	0.31	0.61	0.18	0.18	BaO 0.10 SrO 0.05	99.68	
A1. I	1.084	.144	.018	.018	.062	.061	.062	.037			.008	.001	.003			
6	64.95	15.44	2.02	1.60	2.65	3.07	4.25	3.87	0.85	0.26	0.39	0.25	trace	SO ₃ 0.02 Cl 0.04 BaO 0.35 SrO 0.10	100.11	
A1. I	1.083	.151	.013	.022	.066	.055	.069	.041			.005	.002	—			
7	64.47	15.45	2.25	2.25	2.68	3.63	4.54	3.19	0.63	0.05	0.75	0.22	0.06	BaO 0.23 SrO 0.04	100.44	
A1. I	1.075	.151	.014	.031	.067	.065	.073	.034			.009	.002	—			
8	65.50	14.94	1.72	2.27	2.97	2.33	5.46	2.76	1.13	0.24	0.45	0.09	0.20	SO ₃ 0.06 BaO 0.13 SrO trace	100.25	
A1. I	1.092	.146	.011	.032	.074	.042	.088	.029			.005	—	.003			
9	61.56	14.73	4.47	1.23	3.57	4.87	5.10	2.24	1.42		0.87	0.04	0.34		100.44	
A2. II	1.026	.144	.028	.017	.089	.087	.082	.024			.011	—	.005			
10	62.65	16.68	2.35	2.63	1.43	4.96	4.45	2.75	0.66	0.27	0.42		0.16	BaO 0.13 SrO 0.11 Li ₂ O trace	99.93	
A1. I	1.044	.163	.015	.038	.036	.088	.072	.030			.005		.002			
11	62.95	15.91	3.30	1.37	2.18	4.46	4.05	2.95	1.19	0.72	0.67	0.18	0.08	CO ₂ none ZrO ₂ none BaO 0.03 SrO 0.03	100.07	
A1. I	1.049	.156	.021	.019	.055	.080	.066	.032			.008	.001	.001			
12	62.34	16.40	2.87	3.32	2.10	3.83	4.26	3.25	0.62	0.08	0.96	0.20		CO ₂ none SO ₃ none Cl trace	100.23	2.59
A2. II	1.039	.161	.018	.046	.053	.068	.069	.035			.012	.001				
13	66.55	15.79	0.15	3.08	2.14	3.47	4.39	2.80	0.40	0.05	0.60	0.04	0.06	BaO 0.03 SrO 0.01	99.56	2.678
A2. II	1.109	.155	.001	.043	.054	.063	.071	.030			.008	—	—			
14	60.03	16.15	5.25	2.67	0.60	3.91	4.26	3.45	0.96	0.84	1.36	0.41	0.15	CO ₂ none	100.04	
A2. II	1.001	.158	.033	.038	.015	.070	.069	.037			.017	.003	.002			
15	62.53	15.53	1.99	3.93	1.97	5.10	5.20	1.38	1.94		0.18	0.06	0.26	Cl 0.01 FeS ₂ 0.03 NiO trace BaO 0.13 Cu 0.04	100.29	
A1. I	1.042	.152	.012	.054	.049	.091	.084	.015			.002	—	.004			
16	62.16	16.12	3.39	1.85	2.93	4.59	5.20	2.29	1.12		0.23	0.16	0.20	CO ₂ trace ZrO ₂ trace Cl 0.02 FeS ₂ trace CoO 0.01 BaO 0.07 Cu 0.02 Pb none	100.36	
A1. I	1.036	.158	.021	.026	.073	.082	.084	.024			.003	.001	.003			
17	63.50	15.34	3.22	1.71	2.50	4.31	2.75	1.99							100.16	
A3. III	1.058	.150	.020	.024	.063	.077	.030									
18	63.49	12.42	6.41	1.34	1.32	4.17	4.90	1.78	2.88			trace	0.85	SO ₃ trace Cl trace CuO trace	99.56	2.52
A3. III	1.058	.122	.040	.018	.033	.075	.079	.019				—	.012			
19	66.91	15.09	1.70	1.95	2.02	3.27	4.16	3.16	0.56	0.14	0.67	0.17	0.18	CO ₂ none NiO none BaO 0.05	100.03	
A1. I	1.115	.148	.011	.027	.051	.059	.067	.034			.008	.001	.003			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. DACOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	(I)II.4.2''.(3)4.	Q 19.32 di 2.81 or 20.57 hy 5.20 ab 32.49 mt 2.32 an 12.51 il 1.22 hm 1.28 ap 0.34	Haystack Stock, Park County, Montana.	G. Steiger.	W. H. Emmons, J. G., XVI, p. 207, 1908.	Granodiorite.	
6	(I)II.4''.(2)(3)4.	Q 15.84 di 1.51 or 22.80 hy 6.43 ab 36.16 mt 3.02 an 11.40 il 0.76 ap 0.67	Bear Park, Little Belt Mountains, Montana.	H. N. Stokes.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 519, 1900.	Diorite- syenite (monzonite) porphyry.	In W. T., p. 225.
7	(I)II.4''.(2)''4.	Q 15.36 di 3.09 or 18.90 hy 6.29 ab 38.25 mt 3.25 an 12.23 il 1.37 ap 0.67	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 142, 1897.	Granite.	In W. T., p. 225.
8	(I)II.4(5).2.4.	Q 13.50 di 2.91 or 16.12 hy 3.61 ab 46.11 mt 2.55 an 8.06 il 0.76	Sepulcher Moun- tain, Yellowstone National Park.	T. M. Chatard.	J. P. Iddings, U. S. G. S. A. R. 12, p. 648, 1891.	Andesite.	Also in U. S. G. S. Mon. 32, p. 135, 1899. In W. T., p. 225.
9	II.4(5).2.4.	Q 10.56 di 10.58 or 13.34 hy 4.58 ab 42.97 mt 2.55 an 10.56 il 1.67 hm 2.72	Tower Creek, Yellowstone National Park.	F. A. Gooch.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 272, 1899.	Andesite.	In W. T., p. 225.
10	(I)II.4''.(2)(3).4.	Q 14.16 di 4.54 or 16.68 hy 3.75 ab 37.73 mt 3.48 an 16.96 il 0.76 ap 0.67	Hermano Peak, Sierra El Late, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 14, p. 227, 1894.	Porphyrite.	In W. T., p. 177.
11	(I)II.4.2(3)''4.	Q 16.32 di 4.32 or 17.79 hy 3.50 ab 34.58 mt 2.55 an 15.85 il 1.22 hm 1.60 ap 0.34	Cooks Peak, New Mexico.	G. Steiger.	Lindren, Graton, and Gordon, U. S. G. S. P. P. 68, p. 39, 1910.	Syenite porphyry.	
12	(I)II.4''.(2)(3)''4.	Q 13.44 di 1.79 or 19.46 hy 6.55 ab 36.15 mt 4.18 an 15.85 il 1.82 ap 0.34	O'Leary Peak, San Francisco Mountains, Arizona.	H. H. Robinson.	H. H. Robinson, U. S. G. S. P. P. 76, p. 135, 1913.	Dacite.	
13	(I)II.4.2(3).4.	Q 17.40 di 2.07 or 16.68 hy 9.92 ab 37.20 mt 0.23 an 15.01 il 1.22	Mount Frosty, Hozomeen range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (I), p. 493, 1912.	Granodiorite.	
14	(I)II.4''.(2)''4.	Q 14.28 di 1.73 or 20.57 hy 0.70 ab 36.15 mt 5.34 an 14.46 il 2.58 ap 1.01	Las Cascadas, Panama Canal Zone.	G. Steiger.	D. F. McDonald, U. S. G. S. rec. lab.	Lava.	
15	II.4''.(2)(3).4(5).	Q 12.66 di 8.79 or 8.34 hy 6.33 ab 44.01 mt 2.78 an 14.73 il 0.30	Cuyuni River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Guiana, p. 61, 1908.	Augite porphyrite.	Dried at 100°.
16	''II.4(5).2''4.	Q 10.86 di 6.32 or 13.34 hy 5.00 ab 44.02 mt 4.87 an 13.90 il 0.46 ap 0.34	Mazaruni- Purini River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Guiana, p. 76, 1908.	Granite.	Dried at 100°. In W. T., p. 225.
17	(I)II.4(5).2.4.	Q 13.74 di 7.40 or 16.68 hy 3.36 ab 40.68 mt 4.64 an 11.95	Chiles Volcano, Colombia.	R. Kuch.	R. Kuch, Geol. Stud. Col., I, p. 172, 1892.	Dacite.	In W. T., p. 225.
18	''II 4.2.4.	Q 20.28 di 7.13 or 10.56 wo 2.09 ab 41.39 mt 6.96 an 6.67 hm 1.60	Yate Volcano, Patagonia, Chile.	H. Ziegen- speck.	H. Ziegenspeck, In. Diss. Jena, p. 46, 1883.	Andesite.	In W. T., p. 227.
19	(I)II.4.2''4.	Q 21.24 di 4.20 or 18.90 hy 4.56 ab 35.11 mt 2.55 an 10.29 il 1.22 ap 0.34	Moor of Rausch, n. Ben Nevis, Scotland.	E. G. Radley.	H. B. Maufe, G. S. Grt. Brit., Sum. Prog. (1909), p. 87, 1910.	Granite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
20	64.54	13.63	0.22	4.83	1.25	2.31	5.21	2.28	1.86	0.84	1.22	0.32	0.20	SO ₃ trace F 0.06 FeS ₂ 1.74	100.50	
A2. II	.1076	.134	.001	.067	.031	.041	.084	.024			.015	.002	.003			
21	59.33	12.86	1.88	6.46	2.09	3.74	5.13	2.15	2.12	0.48	3.42	0.39	0.14	F 0.04 FeS ₂ 0.22	100.44	
A2. II	.989	.126	.012	.090	.052	.067	.082	.023			.043	.003	.002			
22	63.41	16.92	2.67	2.96	2.08	4.32	5.18	2.36	0.64						100.54	
A3. III	1.057	.166	.017	.041	.052	.077	.084	.024								
23	62.37	12.04	1.87	5.81	0.97	3.51	3.47	2.34	5.54	0.44	1.06	0.30	0.24	S none NiO none BaO 0.07	100.26	
A2. II	1.040	.118	.012	.081	.024	.063	.056	.025			.013	.002	.003			
24	61.54	18.14	3.29	3.50	1.81	2.95	4.62	2.54	0.52		1.97				100.88	2.610
A3. III	1.026	.177	.021	.049	.045	.053	.074	.027			.025					
25	66.10	13.57	4.80	2.23	0.75	4.13	3.56	2.58	0.54		0.81		0.41		99.48	
A2. II	1.102	.133	.030	.031	.018	.073	.057	.028			.010		.006			
26	56.64	12.84	4.06	8.43	2.01	4.08	3.74	3.17	0.90	0.52	1.88	0.89	0.15	CO ₂ 0.11 S 0.24 BaO 0.10	99.76	
A1. I	.944	.126	.025	.117	.050	.073	.060	.034			.024	.006	.002			
27	64.17	14.73	0.57	5.83	2.09	3.76	3.81	3.35	2.24						100.55	
A3. III	1.070	.144	.004	.080	.052	.067	.061	.036								
28	64.13	13.57	2.40	4.11	1.45	2.91	4.31	3.46	1.45	0.37	0.99	0.56	0.06	CO ₂ 0.59	100.36	
A2. II	1.069	.133	.015	.057	.036	.052	.069	.037			.012	.004	—			
29	64.94	17.50	0.69	3.94	2.83	2.59	3.44	3.11	1.36						100.40	
A3. III	1.082	.172	.004	.055	.071	.047	.055	.022								
30	59.94	16.11	4.29	2.68	3.02	1.74	4.78	2.55	3.07		1.44	0.24		CO ₂ 0.40 SO ₃ 0.17	100.43	2.651
A2. II	.999	.158	.027	.038	.076	.030	.077	.027			.018	.002				
31	63.99	15.12	2.07	4.63	1.68	3.38	4.09	2.76	1.34		0.56		0.29		99.91	
A2. II	1.067	.148	.013	.064	.042	.061	.066	.030			.007		.004			
32	64.31	12.92	4.73	5.26	0.67	2.50	4.44	2.43	1.80		0.25	0.41			99.72	
A2. II	1.072	.127	.029	.073	.017	.045	.072	.026			.003	.003				
33	60.70	14.60	4.32	6.41	1.09	2.04	4.51	3.48	1.70		0.63	0.53			100.01	
A2. II	1.062	.143	.027	.089	.027	.037	.073	.037			.008	.004				
34	65.84	13.63	2.25	3.45	1.85	3.95	4.47	1.76	2.15		0.18	0.18			99.71	
A2. II	1.097	.134	.014	.048	.046	.071	.073	.019			.002	.001				
35	59.98	14.79	5.02	3.25	2.14	5.79	3.77	3.04	1.96		0.07				99.80	
A3. III	1.000	.145	.031	.045	.054	.104	.061	.032			.001					

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. DACOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
20	(I)II.4.2.4.	Q 16.98 di 1.89 or 13.34 hy 9.27 ab 44.01 mt 0.23 an 7.23 il 2.28 ap 0.67 pr 1.74	Caribber Quarry, Linthgow, Scotland.	G. S. Blake.	J. D. Falconer, Tr. R. Soc. Edin., XLV, p. 147, 1908.	Quartz diabase.	"Blue band."
21	II.4(5)''2.4.	Q 11.52 di 8.26 or 12.79 hy 6.00 ab 42.97 mt 2.78 an 5.84 il 6.54 ap 1.01	Kettlestoun, Linthgow, Scotland.	G. S. Blake.	J. D. Falconer, Tr. R. Soc. Edin., XLV, p. 147, 1908.	Feldspathic diabase.	
22	(I)II.4(5).2''4.	Q 11.88 di 4.29 or 13.34 hy 6.28 ab 44.02 mt 3.94 an 16.12	Beinn an Fhurian, Inchnadampf, Assynt, Scotland.	J. J. H. Teall.	J. J. H. Teall, Geol. Mag., XXIII, p. 350, 1886.	Hornblende porphyrite.	In W. T., p. 227.
23	II.4.2''4.	Q 22.68 di 4.52 or 13.90 hy 7.87 ab 29.34 mt 2.78 an 10.29 il 1.98 ap 0.67	Pennygael, Island of Mull, Scotland.	E. G. Radley.	G. S. Grt. Brit., Sum. Prog. (1912), p. 69, 1913.	Glassy rock.	
24	(I)II.4.2''4.	Q 15.96 hy 4.90 or 15.01 mt 4.87 ab 38.77 il 3.80 an 14.73 C 2.35	Chastel, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. Min. Fr., XXV, p. 331, 1902.	Andesite.	
25	(I)II.''4.2(3)''4.	Q 27.18 di 3.89 or 15.57 wo 0.51 ab 29.87 mt 6.26 an 13.34 il 1.52 hm 0.48	Möllenäs, Ronneby, Blekinge, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
26	II.4(5).2.(3)4.	Q 10.50 di 5.02 or 18.90 hy 11.66 ab 31.44 mt 5.80 an 8.90 il 3.65 ap 2.02	Korsudden, N. Ulön., Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 113, 1913.	Fayalite monzonite.	
27	''II.4.2''.(3)4.	Q 15.36 di 4.74 or 20.02 hy 11.82 ab 31.96 mt 0.93 an 13.07	Föglö, Aland, Finland.	H. Berghell.	B. Frosterus, G. F. F., XV, p. 285, 1893.	Granite.	In W. T., p. 227.
28	''II.4.2.(3)4.	Q 18.06 di 2.75 or 20.57 hy 6.20 ab 36.15 mt 3.48 an 7.51 il 1.82 ap 1.34	Kundsbakke, Bornholm Island, Denmark.	M. Dittrich.	G. Kalb, In. Diss. Grief., p. 35, 1914.	Granite.	L. Milch, pers. com.
29	(I)II.4.2(3).(3)4.	Q 20.64 hy 13.83 or 17.79 mt 0.93 ab 28.82 an 13.07 C 3.67	Lippenhof, n. Tryberg, Schwarzwald, Baden.	G. H. Williams.	G. H. Williams, N. J. B. B., II, p. 624, 1883.	Mica diorite.	In W. T., p. 227.
30	''II.4.''2.4.	Q 15.18 hy 7.60 or 15.01 mt 4.64 ab 40.35 il 2.74 an 6.39 hm 1.12 C 3.16 ap 0.67	Gerach, Fischbachthal, Saar Nahe Gebiet, Rhenish Prussia.	K. Gremse.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 290 (1889), 1892.	Porphyrite.	In W. T., p. 227.
31	''II.4.2(3)''4.	Q 17.28 di 2.10 or 16.68 hy 9.48 ab 34.58 mt 3.02 an 14.46 il 1.06	Nadelwitz, Bautzen, Saxony.	Z. Weyberg.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Granite.	
32	''II.4.2.4.	Q 21.72 di 1.43 or 14.46 hy 6.38 ab 37.73 mt 6.73 an 8.06 il 0.46 ap 1.01	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 27, 1909.	Schliere in granite.	Cf. No. 270, I.4.2.3.
33	II.4''2.''4.	Q 13.38 hy 9.83 or 20.57 mt 6.26 ab 38.25 il 1.22 an 6.67 ap 1.34 C 0.92	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 27, 1909.	Schliere in granite.	Cf. No. 270, I.4.2.3.
34	''II.4.2''4.	Q 21.42 di 5.97 or 10.56 hy 5.87 ab 38.25 mt 3.25 an 11.68 il 0.30 ap 0.34	Ujmdava, Krasso-Szoreny, Hungary.	K. Emszt.	Rozloznsnik and Emszt, Mt. Ung. G. A., XVI, p. 190, 1908.	Quartz diorite porphyry.	
35	II.4''2(3)''4.	Q 13.14 di 11.55 or 17.79 hy 1.60 ab 31.96 mt 7.19 an 14.46 il 0.15	Felvacza, Comitat Hunyad, Hungary.	K. Emszt.	K. Emszt, Jb. Ung. G. A., XIV, p. 337 (1904), 1906.	Quartz diorite.	Also in P. Rozloznsnik, F.K., XXXV, p. 512, 1905.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
36	59.24	15.79	7.43	2.53	1.38	5.41	4.94	1.89	1.50						100.11	
A3. III	.987	.155	.046	.035	.035	.096	.080	.020								
37	58.75	12.15	1.57	4.46	8.20	4.70	3.04	2.56	2.05	0.15	1.13	0.76			99.52	2.79
A2. II	.979	.119	.010	.062	.205	.084	.049	.028			.017	.005				
38	58.07	17.11	3.02	4.30	2.98	3.29	3.87	2.92	1.48		1.18	0.67	0.64		99.53	
A2. II	.968	.168	.019	.060	.075	.059	.063	.031			.015	.005	.009			
39	63.94	13.05	2.45	7.52	0.43	3.35	4.45	3.68	0.34			0.93	0.12		100.26	
A?2. II	1.066	.128	.015	.104	.011	.060	.072	.039				.006	.002			
40	61.08	13.66	0.70	5.61	4.69	4.84	3.84	2.23	0.74	0.49	1.76	0.17			99.81	
A2. II	1.018	.134	.004	.078	.117	.087	.062	.023			.022	.001				
41	55.54	11.98	5.48	9.33	1.39	4.99	3.78	2.73	0.83	1.17	1.79	0.73	0.29	FeS ₂ 0.12 V ₂ O ₅ trace NiO 0.04 BaO 0.08	100.27	
A1. I	.926	.118	.034	.129	.035	.089	.061	.029			.022	.005	.004			
42	64.06	15.25	2.72	4.30	1.30	3.93	4.37	2.78	1.70		0.18				100.59	2.352
A3. III	1.068	.149	.017	.059	.032	.070	.070	.031			.002					
43	64.87	16.65	1.46	4.21	1.42	2.88	5.09	1.87	0.10	0.04	1.08	0.23			99.90	
A2. II	1.081	.163	.009	.058	.036	.051	.082	.020			.014	.002				
44	63.44	15.56	1.59	3.75	2.09	4.60	5.30	2.60	0.33		0.97	0.22			100.45	
A2. II	1.057	.153	.010	.052	.052	.082	.085	.028			.012	.002				
45	66.10	14.30	1.17	5.23	1.04	2.41	3.06	2.42	3.25		0.98	0.15			100.11	
A2. II	1.102	.140	.007	.072	.026	.043	.049	.026			.012	.001				
46	67.66	15.39	2.00	2.87	2.48	2.70	3.59	2.66	0.80				0.04		100.19	2.731
A3. III	1.128	.151	.013	.040	.062	.048	.058	.029					—			
47	66.85	14.17	3.83	0.80	1.82	4.28	4.64	2.68	0.12				0.21		99.40	2.499
A3. III	1.114	.139	.024	.011	.046	.077	.075	.029					.003			
48	64.27	14.72	1.48	5.28	2.88	3.08	3.47	2.81	1.08		0.33	0.35			99.75	
A2. II	1.071	.144	.009	.074	.072	.055	.056	.030			.004	.002				
49	61.91	16.26	2.45	3.96	1.81	4.35	4.40	3.04	0.18	0.10	0.79	0.40	0.20	ZrO ₂ none Cl 0.13 F 0.04 S 0.05 Cr ₂ O ₃ none BaO 0.02 SrO 0.06	100.15	
A1. I	1.032	.160	.015	.055	.045	.078	.071	.032			.010	.003	.003			
50	60.13	17.41	4.30	1.68	2.27	3.36	4.88	2.46	n. d.		1.10		0.40	CaSO ₄ 1.57	99.56	2.607
A2. II	1.002	.171	.027	.024	.057	.060	.079	.027			.014		.006			
51	63.58	14.57	1.52	5.92	1.60	4.58	4.86	2.02	0.31		0.71	0.34	trace		100.01	
A2. II	1.060	.143	.010	.082	.040	.082	.078	.021			.009	.002	—			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. DACOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
36	"II.4(5).2(3).4.	Q 12.06 di 7.56 or 11.12 wo 0.70 ab 41.92 mt 8.12 an 15.29 hm 1.76	Allochot, Monzoni, Tyrol.	J. A. Ippen.	J. A. Ippen, N. J. Cb., 1903, p. 386.	Diorite porphyrite.	
37	II(III).4''.2(3). (3)4	Q 10.68 di 5.62 or 15.57 hy 22.40 ab 25.08 mt 2.32 an 11.68 il 2.58 ap 1.68	Val Ufirn, Ponteglia region, Graubünden, Switzerland.	L. Hezner.	F. Weber, U. Gruben- mann, pers. com.	Syenitic lampro- phyre.	
38	II.4''.2.''4.	Q 12.60 hy 12.12 or 17.24 mt 4.41 ab 33.01 il 2.28 an 11.68 ap 1.68 C 3.26	Sondalo, Valtellina, Lombardy.	A. Zapf.	A. Zapf, In. Diss. Jena, p. 22, 1910.	Granodiorite.	
39	II.4''.(1)2.(3)4.	Q 14.46 di 5.51 or 21.68 hy 10.17 ab 37.73 mt 3.48 an 4.73 ap 2.02	Eruption of 1888-89, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 107, 1892.	Andesite.	Bomb. In W. T., p. 227.
40	II.4''.2(3).4.	Q 12.36 di 7.91 or 12.79 hy 14.71 ab 32.49 mt 0.93 an 13.62 il 3.34 ap 0.84	Near Rione Pranu Pira, Monte Arci, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVI, p. 587, 1913.	Hypersthene andesite.	
41	II''.4''.2.''4.	Q 10.44 di 10.49 or 16.12 hy 8.27 ab 31.96 mt 7.89 an 7.78 il 3.34 ap 1.68	Shcheliki, Olonez, Russia.	W. Wahl.	W. Wahl, Fennia, XXIV, No. 3, p. 40, 1908.	Quartz diabase.	
42	(I)II.4.2''4.	Q 16.32 di 5.13 or 17.24 hy 5.90 ab 36.68 mt 3.94 an 13.34 il 0.30	Kakoperato, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Dacite.	In W. T., p. 227.
43	(I)II.4.2.4.	Q 18.60 hy 8.22 or 11.12 mt 2.09 ab 42.97 il 2.14 an 12.23 ap 0.67 C 1.73	Giorgiakameni, Santorini, Greece.	H. S. Washing- ton.	H. S. Washington, XII, Cong. G. Int., C. R. 1913.	Andesite.	
44	"II.4(5).2.4.	Q 10.92 di 7.98 or 15.57 hy 5.24 ab 44.64 mt 2.32 an 11.12 il 1.82 ap 0.67	Kilometer 437, Konakry-Niger Railway, French Guinea.	Not stated.	Col. Azema, C. R. Cong. Soc. Sav., p. 161, 1912.	Granite.	
45	(I)II.(3)4.2(3). (3)4.	Q 29.58 hy 9.60 or 14.56 mt 1.62 ab 25.68 il 1.82 an 11.12 ap 0.34 C 2.55	Manombra River, Sakalave region, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 19, 1913.	Cordierite dacite.	
46	(I)II.4.2(3).''4.	Q 25.26 hy 9.76 or 16.12 mt 3.02 ab 30.39 an 13.34 C 1.63	Boeloer Kasap, Sumatra.	L. Serrurier.	R. D. M. Verbeek, Sum. Westk., p. 232, 1883.	Syenite- granite.	Not in W. T.
47	(I)II.4.2.4.	Q 19.92 di 9.07 or 16.12 hy 0.40 ab 39.30 mt 3.25 an 9.73 hm 1.60	Sello River, Sumatra.	J. J. Penniok.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Andesite, pitchstone.	Not in W. T.
48	II.4.2''.(3)4.	Q 19.56 hy 15.25 or 16.68 mt 2.09 ab 29.34 il 0.61 an 13.34 ap 0.67	Lau Alas, Sumatra.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 49, 1909.	Schliere in granite.	Cf. No. 356, I.4.2.3.
49	"II.4(5).2''4.	Q 12.66 di 2.54 or 17.79 hy 7.00 ab 37.20 mt 3.48 an 15.85 il 1.52 ap 1.01	Simaboer, Merapi, Sumatra.	E. W. Morley.	J. P. Iddings, Igneous Rocks, II, p. 625, 1913.	Andesite, pitchstone.	Also in Iddings and Morley, J. G., XXIII, p. 240, 1915.
50	(I)II.4(5).2(3).4.	Q 10.74 hy 5.70 or 15.01 mt 3.71 ab 41.39 il 2.13 an 18.07 hm 1.76 C 0.52	Eruption of 1883, Krakatoa.	C. Winkler.	R. D. M. Verbeek, Krakatau, p. 292, 1884.	Andesite ash.	In W. T., p. 429.
51	II.4''.2.4.	Q 14.64 di 7.31 or 11.68 hy 8.61 ab 40.87 mt 2.32 an 12.23 il 1.37 ap 0.67	Saipan Island, Mariana Islands.	Klüss.	E. Kaiser, Jb. Pr. G. L.-A., XXIV, p. 120, 1907.	Andesite obsidian.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACOSE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
52	62.44	15.84	3.54	4.82	1.39	4.06	4.78	2.37	0.74		0.28	0.33	trace		100.59	
A2. II	1.041	.155	.022	.067	.035	.066	.077	.026			.004	.002	—			
53	58.77	14.62	5.61	3.16	2.66	6.25	3.82	3.11	1.38		0.05	0.32	0.11	CO ₂ 0.11	99.97	2.597
A2. II	.980	.143	.035	.044	.067	.112	.061	.033			.001	.002	.002			
54	67.33	14.03	1.86	2.88	2.47	2.72	4.36	1.71	1.76	0.10	0.65	0.22	0.03	CO ₂ 0.03 ZrO ₂ none SO ₃ none Cl none S none Cr ₂ O ₃ none NiO trace BaO 0.04 SrO trace	100.19	2.731
A1. I	1.122	.137	.012	.040	.062	.048	.070	.018			.008	.002	—			
55	61.24	14.33	1.81	6.09	3.45	5.07	3.75	3.13	0.28	0.17	0.52	0.51	trace		100.35	2.57
A2. II	1.021	.140	.011	.085	.086	.091	.061	.033			.007	.004	—			
56	63.08	15.10	1.72	4.45	2.67	2.83	4.37	3.86	0.58	0.10	0.68		0.23	CO ₂ 0.11 FeS ₂ 0.17	99.95	2.71
A2. II	1.051	.148	.011	.062	.067	.051	.071	.041			.009		.003			
57	59.35	17.85	5.92	1.23	2.02	7.72	2.55	1.41	0.70	0.44	0.75	0.16	0.05		100.15	
A2. II	.989	.175	.037	.017	.051	.138	.041	.015			.009	.001	—			
58	63.34	15.24	5.15	2.06	0.82	3.30	6.28	2.38	1.78		0.53				100.88	
A3. III	1.056	.149	.032	.029	.021	.059	.102	.026			.007					
59	54.44	12.83	8.32	5.41	2.66	6.90	4.34	1.58	1.58		2.68				100.74 (100.69)	
A3. III	.908	.126	.052	.075	.067	.123	.070	.017			.034					
60	60.19	16.12	3.97	3.07	2.14	4.35	5.22	1.97	1.38		1.15	0.30			99.85	
A2. II	1.003	.158	.025	.043	.054	.078	.084	.021			.014	.002				

RANG 2. DOMALKALIC. DACASE.

1	57.39	15.84	5.68	2.98	2.41	5.24	5.23	0.84	1.74	1.09	1.35	0.68	0.18	CO ₂ trace ZrO ₂ trace Cl 0.05 F trace S 0.01 V ₂ O ₅ trace BaO 0.02	100.73	2.57
A1. I	.957	.155	.036	.042	.060	.094	.084	.009			.017	.005	.003			
2	67.61	14.54	1.13	3.44	1.39	3.18	5.63	0.82	1.48		0.72	0.09	0.16	CO ₂ 0.06 ZrO ₂ none Cl 0.02 S none CoO none BaO 0.11 Cu, Pb none	100.38	
A1. I	1.127	.142	.007	.047	.035	.057	.091	.009			.009	—	.002			
3	62.22	15.39	4.23	2.11	1.24	4.52	6.06	0.93	3.32						100.02	
A3. III	1.037	.151	.026	.029	.031	.080	.098	.010								
4	70.95	14.29	1.19	n. d.	4.20	2.19	5.20	0.77	2.27						101.06	
A4. IV	1.183	.140	.008	(.016)	.105	.039	.084	.008								

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. DACOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
52	"II.4".2".4.	Q 14.28 di 1.64 or 14.46 hy 8.08 ab 40.35 mt 5.10 an 14.46 il 0.61 ap 0.67	Simpson Harbor, New Britain, Bismarck Archipelago.	A. Lindner.	E. Lehmann, T. M. P. M., XXVII, p. 222, 1908.	Andesite.	
53	II.4(5).2".(3)4.	Q 11.10 di 12.32 or 18.35 hy 2.20 ab 31.96 mt 8.12 an 13.62 il 0.15 ap 0.67	Watom Island, New Britain, Bismarck Archipelago.	A. Lindner.	E. Lehmann, T. M. P. M., XXVII, p. 225, 1908.	Andesite.	
54	(I)II.4".2".4.	Q 25.80 hy 8.84 or 10.01 mt 2.78 ab 36.68 il 1.22 an 11.40 ap 0.67 C 0.82	Cooma, New South Wales.	Not stated.	Dep. Mines N. S. W. A. R. (1908), p. 184, 1909.	Quartz porphyry.	
55	II.4(5).2".(3)4.	Q 10.56 di 7.36 or 18.35 hy 14.32 ab 31.96 mt 2.55 an 12.79 il 1.06 ap 1.34	Observation Hill, Tweed Heads, New South Wales.	N. H. Christen- sen.	A. R. Agric. Chem. Qld., 1914.	Andesite.	H. C. Richards, pers. com.
56	"II.4(5).2.(3)4.	Q 10.80 di 3.37 or 22.80 hy 11.01 ab 37.20 mt 2.55 an 10.01 il 1.37	Musquito Creek, Pilbara, West Australia.	J. H. Brooking.	A. G. Maitland, W. Aust. G. S., B. 15, p. 12, 1904.	Granite.	
57	(1)II.4".2.4.	Q 20.88 di 3.40 or 8.34 hy 3.50 ab 21.48 mt 1.86 an 33.08 il 1.37 hm 4.64 ap 0.34	Waimata River, Aroha, Hauraki, New Zealand.	Surv. lab.	Henderson and Bartrum, N. Z. G. S. B. 16, p. 75, 1913.	Andesite.	
58	(I)II.4(5).(1)2.4.	Q 11.22 di 4.54 or 14.46 hy 1.97 ab 53.45 mt 5.10 an 5.84 il 1.06 hm 1.60	Mount Honey, Campbell Island.	P. Marshall.	P. Marshall, Subant. Islds., p. 692, 1909.	Trachyte.	
59	II".4(5).2.4.	Q 9.42 di 14.47 or 9.45 wo 1.97 ab 36.68 mt 9.51 an 10.84 il 5.17 hm 1.76	Mount Lyall, Campbell Island.	P. Marshall.	P. Marshall, Subant. Islds., p. 697, 1909.	"Melilite basalt."	Melilite? Interchange of specimens? Incorrect iden- tification?
60	"II.4(5).2".4.	Q 11.46 di 3.92 or 11.68 hy 4.10 ab 44.01 mt 5.80 an 14.73 il 2.13 ap 0.67	Jenny Island, Weddell Land, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Andesite.	

SUBRANG 5. PERSODIC.

1	II.4".2(3).(4)5.	Q 12.00 di 3.24 or 5.00 hy 4.50 ab 44.01 mt 6.50 an 17.24 il 2.58 hm 1.28 ap 1.68	Point Far Fan, Panama.	R. C. Wells.	D. F. McDonald, U. S. G. S. rec. lab.	Andesite.	
2	(I)II.4.2."5.	Q 21.36 di 3.46 or 5.00 hy 6.13 ab 47.68 mt 1.62 an 11.68 il 1.37	Cuyuni River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Guiana, p. 39, 1908.	Granite gneiss.	
3	(I)II.4".2."5.	Q 13.92 di 7.44 or 5.56 wo 0.35 ab 51.35 mt 6.03 an 11.95	Ottischnigberg, Bachergebirge, Styria.	B. Trobei.	B. Trobei, Mt. Nw. Ver. Steierm., XLIV, p. 192 (1907), 1908.	Granite porphyry.	
4	(I)II.4.2."5.	Q 25.92 hy 12.61 or 4.45 ab 44.01 an 10.84 C 0.92	Koswinsky Kamen, North Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 167, 1902.	Plagioplite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. DACOSE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5	69.19	13.50	1.34	2.06	1.28	5.21	5.59	0.89	1.25						100.31	
A3. III	1.153	.132	.008	.029	.032	.093	.090	.010								
6	61.41	15.61	2.45	5.48	2.55	5.02	5.90	0.42	1.24						100.08	
A3. III	1.024	.153	.016	.076	.064	.089	.095									

RANG 3. ALKALICALCIC. TONALASE. (C. I. P. W., 1902.)

1	61.05	16.03	5.42	0.98	3.03	5.40	1.43	5.58	0.81			0.30		BaO 0.08	100.11	
A2. II	1.018	.157	.034	.014	.076	.096	.023	.060				.002				

RANG 3. ALKALICALCIC. TONALASE.

1	57.92	16.71	4.08	4.26	1.70	3.86	3.68	3.50	1.19		2.13	0.16	0.13	FeS ₂ 0.64	99.96	
A2. II	.965	.164	.026	.059	.043	.069	.060	.037			.027	.001	.002			
2	60.52	16.99	0.60	6.53	1.59	4.58	2.83	3.91	0.88			0.74	0.25	ZrO ₂ trace Cr ₂ O ₃ trace	99.42	
A2. II	1.009	.167	.004	.090	.040	.082	.045	.041				.005	.003			
3	56.20	15.46	1.54	9.76	1.83	5.39	2.78	2.56	0.59	0.16	2.25	1.13	0.13	CO ₂ none SO ₂ trace Cl trace F trace S 0.07 BaO 0.17 SrO trace Li ₂ O none	100.02	
A1. I	.937	.151	.010	.137	.046	.096	.045	.027			.027	.008	.002			
4	58.77	13.12	5.45	6.87	4.93	5.99	1.94	2.83	0.45				trace		100.35	
A3. III	.980	.129	.034	.096	.123	.107	.031	.030					—			
5	64.34	15.72	1.62	2.94	2.17	4.24	2.76	4.04	0.76	0.25	0.53	0.14	0.12	CO ₂ 0.03 ZrO ₂ 0.02 S 0.03 BaO 0.06 SrO 0.03 Cu trace	99.80	
A1. I	1.072	.154	.010	.041	.054	.076	.044	.042			.007	.001	.002			
6	63.88	15.84	2.11	2.59	2.13	3.97	2.81	4.23	0.66	0.22	0.65	0.21	0.07	SO ₂ 0.34 Cl trace BaO 0.09 SrO 0.02	99.82	
A1. I	1.065	.155	.013	.036	.053	.071	.045	.045			.008	.001	.001			
7	63.87	15.39	1.93	3.08	2.23	4.30	2.76	4.18	0.69	0.19	0.65	0.17	0.11	CO ₂ 0.15 ZrO ₂ 0.03 S 0.07 BaO 0.07 SrO 0.04 Cu trace	99.91	
A1. I	1.065	.151	.012	.043	.056	.077	.044	.045			.008	.001	.002			
8	61.64	15.63	3.39	2.69	2.82	4.90	2.64	3.72	0.91	0.28	0.71	0.21	0.04	CO ₂ none SO ₂ none BaO 0.08 SrO 0.04	99.70	
A1. I	1.027	.153	.021	.038	.071	.087	.042	.039			.009	.001	—			
9	64.17	15.25	2.16	2.98	2.60	4.24	2.62	4.34	0.65	0.16	0.67	0.16	0.04	CO ₂ none SO ₂ 0.07 Cl trace BaO 0.07 SrO trace	100.18	
A1. I	1.070	.149	.014	.042	.065	.076	.042	.046			.008	.001	—			
10	60.84	16.36	2.40	3.23	3.85	4.96	2.90	4.10	1.03	0.48					100.05	
A3. III	1.014	.160	.015	.044	.096	.089	.047	.044								

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 5. PERSODIC—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	(I)II.4.2.(4)5.	Q 22.50 di 12.12 or 5.56 wo 0.93 ab 47.16 mt 1.86 an 8.90	Dshaksy Tau Mountains, Mugodjaren, S. Ural Mountains.	Loewinson- Lessing.	E. Jeremina, Exp. Mugo., p. 127, 1905.	Quartz diorite.	
6	II.4(5).2''5.	Q 9.48 di 8.36 or 2.78 hy 10.14 ab 49.75 mt 3.71 an 14.73	Dau, Mugodjaren, S. Ural Moun- tains.	Leberta.	Jeremina and L.-Lessing, Trav. Soc. Nat. St. P., XXXIII, p. 159, 1905.	Spherulite rock.	

SUBRANG 2. DOPOTASSIC.

1	''II.4.3.2.	Q 16.86 di 3.24 or 33.36 hy 6.10 ab 12.05 mt 3.25 an 20.57 fl 3.20 ap 0.67	Swett Hill, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 338, p. 58, 1908.	Dacite.	
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SUBRANG 3. SODIPOTASSIC. HARZOSE. (C. I. P. W., 1902.)

1	''II.4(5).''3.3(4).	Q 12.00 hy 5.36 or 20.57 mt 6.03 ab 31.44 il 4.10 an 18.35 ap 0.34 C 0.10 pr 0.64	Pim Island, Rice Strait, Ellesmere Land.	P. Schei.	C. Bugge, 2nd Fram. Exp., No. 22, p. 18, 1910.	Kersantite.	
2	''II.4''.'''3.3.	Q 14.04 hy 15.75 or 22.80 mt 0.93 ab 23.58 ap 1.68 an 18.07 C 1.63	Milams Gap, Virginia.	W. C. Phalen.	W. C. Phalen, Smiths. Misc. Coll., XLV, p. 311, 1904.	Hypersthene akerite.	
3	II.4.3.3(4).	Q 13.14 hy 18.06 or 14.01 mt 2.32 ab 23.53 il 4.10 an 19.18 ap 2.69 C 1.02	Near Walleska, Cherokee County, Georgia.	H. N. Stokes.	A. H. Brooks, U. S. G. S. B. 168, p. 55, 1900.	Quartz gabbro.	In W. T., p. 229.
4	II''4.3.3.	Q 15.24 di 8.84 or 16.68 hy 16.17 ab 16.24 mt 7.89 an 18.90	St. Cloud, Minnesota.	Dodge and Sidener.	M. Wadsworth, Minn. G. N. H. S. B. 2, p. 86, 1897.	Gabbro.	Dark portion, Cf. No. 12, II.4.3.4. In W. T., p. 229.
5	(I)II.4.3.3.	Q 20.10 di 1.14 or 23.35 hy 8.27 ab 23.06 mt 2.32 an 18.90 il 1.06 ap 0.34	Atlantic Mine, Butte, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. P. P. 74, p. 33, 1912.	Quartz monzonite.	Also in J. G., VII, p. 739, 1899. In W. T., p. 229.
6	(I)II.4.'''3.3	Q 19.38 di 0.68 or 25.02 hy 7.08 ab 23.58 mt 3.02 an 18.07 il 1.22 ap 0.34	Walkerville Station, Butte, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. P. P. 74, p. 33, 1912.	Quartz monzonite.	Also in J. G., VII, p. 739, 1899. In W. T., p. 229.
7	(I)II.4.'''3.3.	Q 18.84 di 2.72 or 25.02 hy 7.57 ab 23.06 mt 2.78 an 17.23 il 1.22 ap 0.34	Alice Mine, Butte, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. P. P. 74, p. 33, 1912.	Quartz monzonite.	Also in J. G., VII, p. 739, 1899. In W. T., p. 229.
8	(I)II.4.3.3.	Q 17.76 di 0.43 or 21.68 hy 7.96 ab 22.01 mt 4.87 an 22.80 il 1.37 ap 0.34	Red Rock Creek, Boulder Moun- tains, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. P. P. 74, p. 33, 1912.	Quartz monzonite.	Also in J. G., VII, p. 739, 1899. In W. T., p. 229.
9	(I)II.4.'''3.3.	Q 19.38 di 2.69 or 25.58 hy 7.84 ab 22.01 mt 3.25 an 16.96 il 1.22 ap 0.34	Frohner Mine, S. of Helena, Boulder Moun- tains, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. P. P. 74, p. 33, 1912.	Quartz monzonite.	Also in J. G., VII, p. 739, 1899. In W. T., p. 229.
10	II.4(5).''3.3.	Q 11.10 di 4.48 or 24.46 hy 11.27 ab 24.63 mt 3.48 an 19.18	Elkhorn District, Montana.	E. C. Sullivan.	W. H. Weed, U. S. G. S. B. 419, p. 93, 1910.	Mica diorite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
11	59.64	16.64	2.33	4.35	2.10	4.59	3.31	4.16	0.69	0.14	1.08	0.49	trace	CO ₂ none S 0.01 Cr ₂ O ₃ none BaO 0.10 SrO 0.05 Li ₂ O trace	99.68	
A1. I	.994	.163	.014	.061	.053	.082	.053	.045			.014	.004	—			
12	59.83	15.86	4.07	2.12	2.73	4.34	3.00	3.55	2.04	1.09	0.70	0.31	0.06	CO ₂ 0.59 ZrO ₂ none NiO none BaO 0.08 SrO 0.02	100.39	
A1. I	.997	.155	.026	.029	.068	.078	.048	.038			.009	.002	—			
13	56.03	15.97	4.78	3.00	3.36	6.44	2.85	3.29	1.08	1.31	1.01	0.48	0.16	S none BaO 0.08 SrO 0.04	99.88	
A1. I	.934	.157	.030	.042	.084	.115	.048	.035			.013	.003	.002			
14	63.46	15.93	2.61	2.31	2.27	4.33	3.66	3.49	0.74	0.27	0.62	0.16	0.09	CO ₂ trace ZrO ₂ 0.03 SO ₃ none Cl 0.05 Cr ₂ O ₃ none BaO 0.15	100.17	
A1. I	1.058	.156	.016	.032	.057	.077	.059	.037			.008	.001	.001			
15	60.17	15.78	3.42	2.95	2.52	4.69	2.96	4.16	1.23	0.25	0.87	0.40	0.11	Cl 0.04 V ₂ O ₅ 0.01 BaO 0.14 SrO 0.09 Li ₂ O trace	99.79	
A1. I	1.003	.154	.021	.042	.063	.084	.048	.045			.011	.003	.001			
16	62.08	16.61	1.53	3.72	2.44	5.20	3.18	3.29	1.00	0.16	0.73	0.30	0.11	BaO 0.09 SrO 0.03	100.47	2.754
A2. II	1.035	.163	.010	.051	.061	.093	.052	.035			.009	.002	.002			
17	60.27	17.17	2.36	3.67	2.45	6.49	2.92	3.25	0.23	0.15	0.63	0.20	0.14	BaO 0.04 SrO 0.04	100.01	2.785
A2. II	1.005	.168	.015	.051	.061	.116	.047	.035			.008	.001	.002			
18	63.85	15.84	1.91	2.75	2.07	4.76	3.29	3.08	1.65	0.28	0.58	0.13	0.07	FeS ₂ 0.04 BaO 0.06 SrO trace Li ₂ O trace	100.36	
A1. I	1.064	.155	.012	.039	.052	.085	.053	.033			.007	.001	.001			
19	57.80	16.43	1.62	6.51	4.14	7.21	2.35	2.29	0.31	0.11	0.70	0.19	0.18	CO ₂ none S none NiO 0.03 BaO 0.09 SrO trace	100.03	
A1. I	.963	.161	.010	.090	.104	.128	.038	.024			.009	.001	.003			
20	57.26	16.51	3.27	5.19	3.41	6.69	2.65	2.93	0.95	0.20	0.53	0.30	0.18	BaO 0.10 SrO 0.06 Li ₂ O trace	100.23	
A1. I	.954	.162	.020	.072	.085	.120	.043	.031			.007	.002	.003			
21	62.97	15.52	4.03	1.45	2.07	5.31	3.31	3.46	0.48	0.66	0.67	0.18	0.10	CO ₂ 0.18 ZrO ₂ trace S trace BaO 0.09 SrO 0.02	100.50	
A1. I	1.050	.152	.025	.020	.052	.095	.053	.037			.008	.001	.001			
22	61.25	15.92	3.75	1.17	2.28	5.39	3.19	3.23	1.88	1.08	0.71	0.22	0.08	CO ₂ none	100.15	
A2. II	1.021	.156	.024	.017	.057	.096	.052	.034			.009	.002	.001			
23	59.79	17.70	2.42	2.76	1.92	5.22	2.64	4.19	2.00			0.37	0.09	BaO 0.21	99.31	
B2. III	.997	.174	.015	.039	.048	.093	.043	.045				.003	.001			
24	58.55	15.48	3.93	2.07	3.60	6.44	1.69	3.99	3.62		0.83	0.30	0.11		100.61	2.71
A2. II	.976	.152	.024	.030	.090	.115	.027	.042			.010	.002	.002			
25	62.07	16.03	0.80	4.76	3.34	5.45	3.07	2.80	0.55	0.26	0.80	0.10		S 0.01	100.04	
A2. II	1.035	.157	.005	.066	.084	.097	.050	.030			.010	.001				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. SODIOPOTASSIC. HARZOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
11	"II.4(5).(2)3.3.	Q 11.16 di 0.92 or 25.02 hy 9.19 ab 27.77 mt 3.25 an 18.07 il 2.13 ap 1.34	Elkhorn Mountain, Elkhorn District, Montana.	H. N. Stokes.	J. S. Barrell, U. S. G. S. A. R. 22, II, p. 525, 1901.	Andesite.	
12	(I)II.4.(2)3.3.	Q 18.06 hy 6.80 or 21.13 mt 4.64 ab 25.15 il 1.37 an 15.57 hm 0.96 C 1.33 ap 0.67 oc 1.40	Wetterhorn Peak, Ouray quadrangle, Colorado.	G. Steiger.	Cross and Howe, U. S. G. S. Fol. 153, p. 12, 1907.	Quartz- biotite latite.	
13	II.4(5).3.3''.	Q 10.26 di 6.70 or 19.46 hy 5.56 ab 25.15 mt 6.96 an 20.57 il 1.98 ap 1.01	Dolly Vardon Mine, Henson Creek, Silverton, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. Fol. 120, p. 9, 1905.	Quartz latite.	
14	(I)II.4.(2)3.3(4).	Q 16.92 di 3.09 or 20.57 hy 5.42 ab 30.92 mt 3.71 an 16.68 il 1.22 ap 0.34	Brighton Gap, Park City District, Utah.	W. F. Hille- brand.	J. M. Boutwell, U. S. G. S. P. P. 77, p. 79, 1912.	Quartz diorite.	
15	"II.4''.(2)3.3.	Q 14.16 di 2.87 or 25.02 hy 6.39 ab 25.15 mt 4.87 an 16.96 il 1.67 ap 1.01	Tintic Mountain, Tintic District, Utah.	H. N. Stokes.	Tower and G. O. Smith, U. S. G. S. A. R. 19, III, p. 641, 1899.	Andesite.	Also in U. S. G. S. Fol. 65, p. 3, 1900. In W. T., p. 229.
16	"II.4'' .3.3''.	Q 15.36 di 2.29 or 19.46 hy 9.46 ab 27.25 mt 2.32 an 21.13 il 1.37 ap 0.67	Trail, W. Kootenai District, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 347, 1912.	Granodi- orite.	
17	"II.4'' .3.3''.	Q 13.50 di 6.55 or 19.46 hy 6.87 ab 24.63 mt 3.48 an 23.35 il 1.22 ap 0.34	Bayonne Batholith, Nelson Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 291, 1912.	Granodi- orite.	
18	(I)II.4.3.3(4).	Q 19.44 di 2.94 or 18.35 hy 6.54 ab 27.77 mt 2.78 an 19.18 il 1.06 ap 0.34	Grass Valley, Nevada County, California.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 44, 1896.	Granodi- orite.	In W. T., p. 229.
19	II.4(5).3(4).3(4).	Q 10.74 di 6.00 or 13.34 hy 18.50 ab 19.91 mt 2.32 an 27.52 il 1.37 ap 0.34	Sonora, Tuolumne County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 724, 1896.	Quartz diorite.	In W. T., p. 229.
20	II.4(5).3.3''.	Q 10.56 di 5.69 or 17.23 hy 12.05 ab 22.53 mt 4.64 an 24.46 il 1.06 ap 0.67	Milton, Sierra County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 724, 1896.	Quartz diorite.	In W. T., p. 229.
21	(I)II.4.''3.''3.	Q 18.18 di 6.48 or 20.57 hy 2.30 ab 27.77 mt 2.78 an 17.24 il 1.22 hm 2.08 ap 0.34	Coyote Springs, Pah-Ute Range, Nevada.	W. F. Hille- brand.	J. E. Spurr, U. S. G. S. B. 228, p. 206, 1904.	Quartz latite.	
22	(I)II.4.3.3(4).	Q 17.28 di 4.10 or 18.90 hy 3.90 ab 27.25 mt 1.62 an 19.46 il 1.37 hm 2.72 ap 0.67	Diamond Peak, Goldfield Dis- trict, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 56, 1909.	Dacite.	
23	(I)II.4'' .3.3.	Q 13.50 hy 7.97 or 25.02 mt 3.48 ab 22.53 ap 0.84 an 23.91	Lane City, Egan Range, Nevada.	H. Ross.	A. C. Lawson, Un. Cal., Dep. G. B., IV, p. 310, 1906.	Monzonite porphyry.	
24	II.4.3.(2)3.	Q 16.86 di 5.40 or 23.35 hy 6.50 ab 14.15 mt 5.10 an 23.07 il 1.52 hm 0.32 ap 0.67	Cedar Hill Ridge, Washoe, Nevada.	G. E. Moore.	G. F. Becker, U. S. G. S. Mon. 2, Table I, 1882.	Andesite.	In W. T., p. 229.
25	II.4.3.3(4).	Q 14.94 di 3.86 or 16.68 hy 13.24 ab 26.20 mt 1.16 an 21.41 il 1.52 ap 0.34	Cerro de Perico, n. Jorullo Volcano, Mexico.	F. Roel.	E. Ordóñez, Cong. G. Int. X, Guide XI, p. 55, 1906.	Diorite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.		Sum.	Sp. gr.
26	61.52	16.00	2.93	2.05	2.03	6.72	3.09	3.83	0.16		0.78	0.45		CO ₂ S SrO	0.45 trace 0.11	100.12	
A2. II	1.025	.157	.018	.029	.051	.120	.050	.040			.010	.003					
27	61.55	14.01	0.37	7.27	5.26	4.80	2.29	2.52	0.45		0.28	0.02	0.46	CO ₂ ZrO ₂ Cl BaO	0.19 0.01 0.05 0.61	100.14	
A1. I	1.026	.137	.002	.101	.132	.086	.037	.027			.003	—	.007				
28	57.92	16.04	5.81	3.13	2.19	4.42	3.28	4.15	2.08		0.67	0.39		BaO	trace	100.08	2.740
A2. II	.965	.157	.036	.043	.055	.079	.053	.044			.008	.003					
29	61.27	16.37	4.59	1.18	2.29	4.44	3.34	3.41	2.00		0.64	0.12	trace	X Li ₂ O	0.85 trace	100.50	2.631
A2. II	1.021	.160	.029	.016	.057	.079	.053	.036			.008	.001	—				
30	61.03	16.55	2.34	2.66	1.98	3.93	3.62	3.74	3.52		0.79		trace	SrO	trace	100.21	2.665
A3. III	1.017	.162	.015	.037	.050	.071	.058	.039			.010		—				
31	62.6	17.7	1.2	3.3	3.4	4.6	2.5	3.7	0.7							99.7	2.76
B3. IV	1.043	.174	.007	.046	.085	.082	.040	.039									
32	59.21	14.06	2.66	4.87	3.71	5.95	2.06	2.83	1.49	2.06	1.06	0.20	0.24	S NiO BaO	none none 0.03	100.43	
A1. I	.987	.138	.017	.068	.093	.106	.033	.030			.013	.001	.003				
33	58.85	16.41	1.00	8.85	2.63	3.99	3.02	2.76	1.01		2.03	0.06				100.61	
A2. II	.981	.161	.006	.123	.066	.071	.048	.030			.025	—					
34	60.80	18.10	0.70	3.87	4.92	4.71	2.32	2.58	2.89							100.88	
A3. III	1.013	.177	.004	.054	.123	.084	.037	.028									
35	63.55	15.60	trace	5.10	3.65	4.49	2.55	2.92	1.50		0.91	0.19				100.46	
A2. II	1.059	.153	—	.071	.091	.080	.041	.032			.011	.001					
36	62.75	15.43	0.29	3.47	3.09	5.00	2.37	5.12	1.01		0.81	0.43				99.79	
A2. II	1.046	.151	.002	.049	.077	.089	.039	.054			.010	.003					
37	55.95	19.35	4.60	3.00	2.52	5.40	2.86	2.64	1.05		2.80		0.21			100.38	
A2. II	.933	.190	.029	.042	.063	.096	.046	.028			.034		.003				
38	63.74	14.87	3.72	2.21	1.93	4.90	3.06	3.29	0.94		0.69	0.36	0.15			99.86	
A2. II	1.062	.146	.023	.031	.048	.088	.049	.035			.009	.002	.002				
39	61.44	17.00	1.90	3.39	1.73	4.26	3.01	4.90	0.65		1.14		0.75			100.17	
A2. II	1.024	.167	.012	.047	.043	.076	.048	.052			.014		.011				
40	60.83	15.12	3.88	4.82	1.97	4.11	3.50	3.15	1.19		1.35		0.39			100.31	
A2. II	1.014	.148	.014	.067	.049	.073	.056	.034			.017		.006				
41	63.50	16.08	0.12	3.37	2.47	4.93	2.94	3.05	2.11		0.57	0.15	0.07			99.36	
B2. III	1.068	.158	.001	.047	.062	.088	.047		.032		.007	.001	.001				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. SODIPOTASSIC. HARZOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
26	"II.4''."3.3.	Q 15.36 di 9.32 or 22.24 hy 0.90 ab 26.20 mt 4.13 an 18.63 il 1.52 ap 1.01	Aranzazu, Concepcion de Oro, Zacatecas, Mexico.	M. Dittrich.	A. Bergeat, N. J. B. B., XXVIII, p. 438, 1909.	Granodiorite.	Also in Bol. Inst. G. Mex., No. 27, p. 12, 1910.
27	II.4.3.3''.	Q 14.88 di 3.00 or 15.01 hy 25.30 ab 19.39 mt 0.46 an 20.29 il 0.46	Groete Creek, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Guiana, p. 77, 1908.	Augite granite.	
28	"II.4(5).(2)3.3.	Q 11.94 di 1.94 or 24.46 hy 4.60 ab 27.77 mt 8.35 an 16.68 il 1.22 ap 1.01	Cerro Gordo, Upper Magdalena River, Colombia.	A. Lindner.	E. Lehmann, T. M. P. M., XXX, p. 269, 1911.	Latite.	
29	(I)II.4.3.3(4).	Q 16.98 di 1.08 or 20.02 hy 5.20 ab 27.77 mt 1.86 an 19.74 il 1.22 hm 3.36 ap 0.34	Cuesta de Acay, Salta, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 589, 1906.	Mica andesite.	
30	(I)II.4''.(2)3.3(4)	Q 14.22 di 1.36 or 21.68 hy 5.92 ab 30.39 mt 3.48 an 18.07 il 1.52	Cochinoca, Jujuy, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 612, 1906.	Diorite porphyrite.	
31	(I)II.4.3.3.	Q 16.86 hy 13.65 or 21.68 mt 1.62 ab 20.96 an 22.80 C 1.33	Ben Damhaim, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Granitite.	In W. T., p. 229.
32	II.4.3.3.⊙	Q 17.82 di 6.32 or 16.68 hy 11.62 ab 17.29 mt 3.94 an 20.85 il 1.95 ap 0.34	Mullach Glach, Pennygael, Mull, Scotland.	E. G. Radley.	G. S. Gt. Brit., Sum. Prog., (1912), p. 69, 1913.	Tholeite pitchstone.	"Stony portion." Cf. No. 140, II.4.3.4.
33	II.4''."3.3(4).	Q 12.73 hy 18.74 or 16.68 mt 1.39 ab 25.15 il 3.80 an 19.74 C 1.22	Brée, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 158, 1913.	Microgabbro.	
34	II.4.3''."3''.	Q 16.92 hy 18.90 or 15.57 mt 0.93 ab 19.39 an 23.35 C 2.86	Saint Maigner, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Kersantite.	
35	II.4.3.3''.	Q 19.32 hy 17.02 or 17.24 il 1.67 ab 21.48 ap 0.34 an 21.41 C 1.02	Serrat de Soupère, Bagnères de Luchon, Pyrenees.	Pisani.	A. de Romeu, B. Soc. Min. Fr., XXX, p. 147, 1907.	Microdiorite.	
36	"II.4''.(2)3.''3.	Q 14.22 di 4.76 or 30.02 hy 10.26 ab 20.44 mt 0.46 an 16.12 il 1.52 ap 1.01	Near Corte, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 56, 1907.	Trachyan- desite.	
37	"II.4''."3.3(4).	Q 14.04 hy 6.30 or 15.57 mt 2.55 ab 24.10 il 5.17 an 26.67 hm 2.88 C 2.04	Fjulsrud, Humledal, n. Christiania, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 53, 1890.	Porphyry.	In W. T., p. 229.
38	(I)II.4.''3.3''.	Q 21.96 di 4.10 or 19.46 hy 3.03 ab 25.68 mt 5.34 an 17.24 il 1.37 ap 0.67	Nya Varfvet, Göteborg, Sweden.	O. Berg.	P. J. Holmquist, B. Un. Ups., VII, p. 268, 1906.	Granite gneiss.	
39	(I)II.4(5).(2)3.3.	Q 12.36 di 2.07 or 24.91 hy 7.50 ab 25.15 mt 2.78 an 18.63 il 2.13	Djupadal, Oskarshamn, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 264, 1906.	Granite.	
40	II.4.(2)3.3(4).	Q 15.72 di 3.43 or 18.90 hy 7.43 ab 29.34 mt 5.57 an 16.12 il 2.58	Flohult, Oskarshamn, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 262, 1906.	Granite.	
41	(I)II.4.3.3(4).	Q 18.96 di 2.07 or 17.79 hy 10.32 ab 24.63 mt 0.23 an 21.96 il 1.06	Sassi, Finland.	I. G. Sundell.	V. Hackmann, B. C. G. Fin., 15, p. 50, 1905.	Quartz diorite.	

CLASS II. DOSALANE—Continued.

RANG 2. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
42	57.69	14.48	4.40	1.71	5.63	5.42	2.73	2.94	3.44		0.82	0.29		CO ₂ 0.11 SO ₃ 0.17 Org 0.05	99.88	2.66
A2. II	.962	.142	.027	.024	.141	.096	.043	.031			.010	.002				
43	62.39	15.98	2.39	3.16	2.53	4.43	3.46	3.75	1.13		0.37		0.78		100.37	
A2. II	1.040	.157	.015	.044	.063	.079	.056	.040			.005		.011			
44	64.99	14.53	1.35	6.10	1.07	3.38	2.93	2.97	1.94		1.11	0.23			100.60	2.755
A2. II	1.083	.142	.009	.085	.027	.061	.047	.032			.014	.002				
45	57.64	14.49	3.17	5.81	4.62	8.02	2.13	2.32	1.77		0.31	0.23		CO ₂ 0.13	100.64	2.837
A2. II	.961	.142	.020	.080	.116	.143	.034	.024			.004	.002				
46	56.91	15.54	2.32	4.98	5.71	5.80	2.45	2.74	2.29		1.09	0.21		SO ₃ 0.15	100.19	2.791
A2. II	.959	.152	.014	.070	.143	.103	.040	.029			.013	.002				
47	63.06	18.01	2.48	1.31	4.55	2.72	2.01	3.88	2.20						100.22	
A3. III	1.051	.176	.016	.018	.114	.048	.032	.041								
48	65.87	14.88	1.77	3.11	2.93	4.61	2.12	4.22	0.83		0.43	trace			100.77	2.899
A3. III	1.098	.146	.011	.043	.072	.082	.034	.045			.005					
49	62.69	12.77	3.22	4.79	3.09	5.02	2.39	3.63	1.06		1.22	trace	0.60		100.48	2.952
A2. II	1.045	.125	.020	.067	.077	.089	.039	.038			.014	—	.009			
50	60.58	11.92	3.05	8.14	3.88	6.97	1.21	2.55	0.95		1.14	trace	0.63		101.02	2.926
B2. III	1.010	.117	.020	.112	.097	.125	.019	.027					.007			
51	52.67	13.66	7.33	1.44	4.01	7.94	3.79	2.51	1.51	1.07	2.58	0.52	0.78	F 0.17	99.98	
A2. II	.878	.134	.046	.020	.100	.142	.061	.027			.032	.004	.011			
52	63.10	16.40	2.77	4.80	1.68	4.94	2.44	2.40	1.24			0.26		S 0.25	100.28	
A3. III	1.052	.161	.017	.067	.042	.088	.039	.026				.002				
53	61.36	16.70	2.00	5.58	2.70	5.52	2.21	3.01	1.16			0.24		S 0.01	100.49	
A3. III	1.023	.164	.013	.078	.068	.098	.035	.032				.002				
54	57.02	16.52	3.25	6.27	2.42	8.64	2.38	2.54	1.28						100.32	
A3. III	.950	.162	.021	.088	.061	.154	.039	.027								
55	65.34	16.53	1.16	3.40	1.62	4.70	2.41	3.23	0.67		trace	1.54			100.60	2.688
A3. III	1.089	.162	.007	.047	.041	.084	.039	.034			—	.011				
56	52.15	14.93	7.07	6.10	5.93	5.62	1.74	3.34	0.88		1.12	1.58			100.46	2.917
A2. II	.869	.146	.044	.085	.148	.100	.028	.035			.014	.011				
57	58.68	17.84	2.05	5.30	2.87	6.03	2.15	3.22	1.53		0.16		trace		99.83	2.76
A3. III	.978	.175	.013	.074	.072	.107	.035	.034			.002		—			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. SODIOPOTASSIC. HARZOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
42	II.4''.3.3.	Q 13.20 di 4.54 or 17.24 hy 12.00 ab 22.53 mt 3.25 an 18.90 il 1.52 hm 2.08 ap 0.67	Peterberg, Blatt Wadern, Rheinland.	K. Böttcher.	H. Greb, Erl. G. Kt. Pr., Bl. Wadern, p. 34, 1889.	Bronzite porphyrite.	Also in K. A. Lossen, Jb. Pr. G. L.-A. (1889), p. 290, 1892. In W. T., p. 229.
43	''II.4''.(2)3.3''.	Q 13.56 di 4.08 or 22.24 hy 8.93 ab 29.34 mt 3.48 an 16.96 il 0.76	Wehrathal, Schwarzwald, Baden.	Not stated.	O. H. Erdmannsdörfer, Mt. Bad. G. L.-A., IV (2), p. 168, 1901.	Granite.	
44	''II.4.(2)3.3''.	Q 24.72 hy 10.88 or 17.79 mt 2.09 ab 24.63 il 2.13 an 15.01 ap 0.67 C 0.92	Schmalenberg, n. Ettersgrund, Brocken, Harz.	K. Hampe.	O. H. Erdmannsdörfer, Jb. Pr. G. L.-A., XXVII, p. 347, 1906.	Granite.	
45	II.4.3''.3''.	Q 13.26 di 11.81 or 13.34 hy 13.22 ab 18.42 mt 4.64 an 23.35 il 0.61 ap 0.67	Ole Padde, Harz.	F. Steffen.	K. A. Lossen, Jb. Pr. G. L.-A., (1889), p. 290, 1892.	Tonalite.	In W. T., p. 229.
46	II.4(5).3.3.	Q 10.92 di 3.37 or 16.12 hy 18.38 ab 20.96 mt 3.25 an 22.52 il 1.98 ap 0.67	Bolmke Thal, n. Wernigerode, Harz.	K. Hampe.	K. A. Lossen, Jb. Pr. G. L.-A. (1889), p. 309, 1892.	Enstatite porphyrite.	In W. T., p. 229.
47	(I)II.4.(2)3.3.	Q 23.94 hy 11.63 or 22.50 mt 3.71 ab 16.77 an 13.34 C 5.61	Arnsdorf, Riesengebirge, Silesia.	Herz.	L. Milch, N. J. B. B., XII, p. 223, 1899.	Schliere in granite.	In W. T., p. 231.
48	(I)II.4.2.''3.	Q 22.50 di 3.40 or 25.02 hy 9.20 ab 17.82 mt 2.55 an 18.63 il 0.76	Wachberg, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 218.	Syenite.	In W. T., p. 231.
49	II.4.(2)3.3.	Q 19.62 di 9.31 or 21.13 hy 8.70 ab 20.44 mt 4.64 an 13.34	Neudeck, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 220.	Syenite.	In W. T., p. 231.
50	II(III).''4.3(4). ''3.	Q 21.18 di 12.49 or 15.01 hy 15.08 ab 9.43 mt 4.64 an 19.74 il 1.98	Neudeck, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 222.	Syenite.	In W. T., p. 231.
51	II''.4''.3.3(4).	Q 11.16 di 11.02 or 15.01 hy 4.90 ab 21.48 il 4.71 an 18.35 hm 7.33 tn 0.20 ap 1.84	Alvernia, n. Cracow, Galicia.	Z. Rozen.	Z. Rozen, B. Ac. Sc. Crac., 1909, p. 801.	Melaphyre.	Fresh?
52	(I)II.4.3.3(4).	Q 24.60 hy 10.54 or 14.46 mt 3.94 ab 20.44 ap 0.67 an 22.52 C 1.53	Gomagoi, Vintschgau, Tyrol.	C. v. John.	Hammer and V. John, Jb. G. R.-A., Wien, LIX (3), p. 712, 1910.	Granodiorite.	
53	II.4.3''.3.	Q 18.36 hy 15.38 or 17.79 mt 3.02 ab 18.34 ap 0.67 an 25.30 C 0.61	Valdaschlikopf, Vintschgau, Tyrol.	C. v. John.	Hammer and V. John, Jb. G. R.-A., Wien, LIX (3), p. 709, 1910.	Tonalite.	
54	II.4(5).3''.3''.	Q 10.56 di 13.49 or 15.01 hy 8.18 ab 20.44 mt 4.87 an 26.69	Hinterer Gratspitz, Tyrol.	C. v. John.	W. Hammer, Jb. G. R.-A., Wien, LIII, p. 71, 1904.	Suldenite.	
55	(I)II.(3)4.(2)3.3.	Q 28.56 hy 9.38 or 18.90 mt 1.62 ab 20.44 ap 3.70 an 13.07 C 4.28	Zinsnock, Rieserferner, Tyrol.	R. Pfohl.	F. Becke, Ds. Ak. W. Wien, LXXXV (1), p. 160, 1913.	Tonalite.	P ₂ O ₅ high?
56	II(III).4''.3.3.	Q 11.22 hy 18.76 or 19.46 mt 10.21 ab 14.67 il 2.13 an 17.51 ap 3.70 C 2.04	Taufers, Rieserferner, Tyrol.	R. Pfohl.	F. Becke, Ds. Ak. W. Wien, LXXV (1), p. 160, 1913.	Diorite.	Schlieren in No. 7, II.4.3.3. SiO ₂ given as 72.15.
57	II.4''.3(4).3.	Q 13.20 di 0.22 or 18.90 hy 14.89 ab 18.34 mt 3.02 an 29.47 il 0.30	Töll, n. Meran, Ulten Massif, Tyrol.	E. Zdarek.	F. Becke, Ds. Ak. W. Wien, LXXXV (1), p. 160, 1913.	Töllite (tonalite porphyry).	Border.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
58	61.23	16.96	1.80	4.16	2.18	4.60	3.27	3.37	0.61	0.20	0.78	0.66			99.82	
A2. II	1.021	.166	.011	.058	.055	.082	.053	.036			.010	.005				
59	60.38	15.74	5.10	1.13	2.82	4.77	3.37	3.34	1.95	0.07	1.64				100.31	2.77
A3. III	1.006	.154	.032	.015	.071	.086	.055	.035			.021					
60	57.97	17.65	6.17	1.74	4.00	4.74	2.11	3.67	1.09	0.06	1.08	0.17			100.45	2.836
A2. II	.966	.173	.039	.024	.100	.085	.034	.039			.014	.001			(100.15)	
61	60.15	16.65	2.80	3.21	2.99	4.32	2.07	3.88	3.47	0.28	0.82				100.64	2.817
A3. III	1.003	.163	.018	.044	.075	.077	.034	.041			.010				(100.61)	
62	59.29	15.18	3.82	2.84	2.92	3.77	2.22	5.09	3.78	0.24	0.68				99.83	2.804
A3. III	.988	.149	.024	.039	.073	.068	.035	.054			.009					
63	68.6	16.5	0.8	2.3	0.6	1.9	2.8	5.6	1.0		0.3				100.7	
B3. IV	1.143	.162	.005	.032	.015	.034	.045	.060			.004					
64	60.03	17.05	1.83	4.15	1.12	6.58	2.31	5.12	1.40			0.42	0.09		100.12	2.543
A?3. III	1.001	.167	.011	.058	.028	.118	.037	.055				.003	.001			
65	56.32	18.17	2.23	6.47	2.84	5.33	1.80	4.18	2.15			0.34			99.83	2.520
A?3. III	.939	.178	.014	.090	.071	.095	.029	.045				.002				
66	59.41	19.06	1.87	3.42	2.05	4.09	2.58	5.29	0.64	0.91	1.00	0.29		CO ₂ none	100.61	
A2. II	.990	.187	.012	.047	.051	.073	.042	.056			.012	.002				
67	59.08	17.75	2.66	3.41	3.59	6.38	2.31	3.82	0.88						99.84	2.70
A3. III	.985	.174	.017	.047	.090	.114	.037	.040								
68	56.43	19.00	3.54	2.83	4.03	5.08	2.08	4.23	0.65	0.13	0.82	0.91	trace	Cl 0.09	99.82	
A2. II	.941	.186	.022	.039	.101	.091	.034	.045			.010	.006	—			
69	64.02	15.00	1.80	4.35	3.93	3.80	3.10	2.83	0.75		0.88	0.30			100.76	
A2. II	1.067	.147	.011	.061	.098	.068	.050	.030			.011	.002				
70	60.30	18.44	2.54	2.92	3.34	5.53	3.03	3.12	0.68						99.90	
A3. III	1.005	.181	.016	.040	.084	.098	.048	.033								
71	60.68	16.19	5.37	1.58	2.96	5.88	3.11	3.95	0.98						100.70	2.640
A3. III	1.011	.159	.034	.022	.074	.105	.050	.042							17°	
72	64.90	12.61	0.79	4.30	2.46	8.22	2.00	3.82	0.20		0.30			CO ₂ 0.53	100.13	
A3. III	1.082	.124	.005	.060	.062	.146	.032	.040			.004					
73	62.86	15.43	0.80	4.02	4.40	6.11	2.50	2.81	0.38		0.27				99.58	
A3. III	1.048	.151	.005	.056	.110	.109	.040	.030			.003					

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 3. SODIPOTASSIC. HARZOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
58	"II.4."3.3".	Q 15.90 hy 10.38 or 20.02 mt 2.55 ab 27.77 il 1.52 an 18.07 ap 1.68 C 1.22	Mätteli, St. Gotthard, Switzerland.	K. M. Jene.	P. Waindziok, In. Diss. Zür., p. 44, 1906.	Quartz diorite porphyry.	
59	"II.4."3.3(4).	Q 14.70 di 3.46 or 19.46 hy 5.50 ab 28.52 il 2.28 an 17.79 hm 5.10 tn 1.18	Stücklistock, Aarmassif, Switzerland.	O. Fischer.	O. Fischer, T. M. P. M., XXIV, p. 95, 1905.	Diorite porphyrite.	
60	II.4.3.3.⊙	Q 15.84 hy 10.00 or 21.68 mt 2.32 ab 17.82 il 2.13 an 22.80 hm 4.64 C 1.84 ap 0.34	Piz Giuf, Aarmassif, Switzerland.	Not stated.	F. Weber, Btr. G. Kt. Schw., XIV, p. 86, 1904.	Kersantite.	
61	"II.4.3.3	Q 18.48 hy 9.61 or 22.80 mt 4.18 ab 17.82 il 1.52 an 21.41 C 1.12	Platta Mala, Lower Engadine, Switzerland.	O. Züst.	U. Grubenmann, Btr. G. Kt. Schw., XXII, p. 193, 1909.	Monzonite.	Basic facies of granite. Cf. No. 191, I.4.1.3.
62	"II.4".(2)3.(2)3.	Q 14.82 di 1.76 or 30.02 hy 7.26 ab 18.34 mt 5.57 an 16.68 il 1.37	Alp Laret, Lower Engadine, Switzerland.	O. Züst.	O. Züst, In. Diss. Zür., v. 22, 1905.	Syenite.	Mica vogesite in U. Gruben- mann, Btr. G. Kt. Schw., XXIII, p. 204, 1909.
63	II.4.3."3.	Q 24.42 hy 4.54 or 33.36 mt 1.16 ab 23.58 il 0.61 an 9.45 C 2.35	Bed of Letimbro River, Savona, Liguria.	J. de Lap- parent.	Termier and Boussoe, B. Soc. G. Fr., XII, p. 276, 1912.	Granite.	
64	"II.4(5).3.(2)3.	Q 11.58 di 7.37 or 30.58 hy 5.23 ab 19.39 mt 2.55 an 20.85 ap 1.01	San Mágno, Latera, Lake Bolsena, Italy.	A. Ricciardi.	C. Klein, Sb. Berl. Ak., V, p. 99, 1888.	Trachyte.	Also in N. J. B. B., VI, p. 10, 1889. In W. T., p. 231.
65	II.4(5).3.3(4).	Q 10.32 hy 17.13 or 25.02 mt 3.25 ab 15.20 ap 0.67 an 24.46 C 1.63	Mont' Alfina, Lake Bolsena, Italy.	A. Ricciardi.	C. Klein, Sb. Berl. Ak., V, p. 96, 1888.	Trachyte.	Also in N. J. B. B., VI, p. 7, 1889. In W. T., p. 271.
66	(I)II.4(5).(2)3."3.	Q 11.76 hy 8.14 or 31.14 mt 2.78 ab 22.01 il 1.82 an 18.35 ap 0.67 C 2.35	La Cava, Monte Cimino, n. Viterbo, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 56, 1906.	Biotite latite.	
67	"II.4(5).3.3.	Q 11.52 di 3.80 or 22.24 hy 10.13 ab 19.39 mt 3.94 an 26.97	Sant' Egidio, Vico Volcano, n. Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Oligolabra- diorite (vulsinite).	
68	II.4."3."3.	Q 13.02 hy 11.02 or 25.02 mt 5.10 ab 17.82 il 1.52 an 19.74 ap 2.02 C 3.67	Santa Teresa Volcano, Phlegrean Fields, n. Naples, Italy.	F. S. Star- rabba.	F. S. Starrabba, Atti Ac. Sc. Nap. (2), XIV, No. 7, p. 6, 1910.	Andesite.	Inclusions in tuff.
69	II.4."3.(2)3.	Q 19.68 hy 14.95 or 16.68 mt 2.55 ab 20.20 il 1.67 an 16.96 ap 0.67 C 0.62	San Gimignano, Capo Bellavista, Sardinia.	C. Riva.	C. Riva, Atti Ac. Sc. Nap. (2), XII, No. 9, p. 45, 1905.	Quartz diorite porphyry.	
70	(I)II.4."3.3".	Q 12.90 hy 11.57 or 13.35 mt 3.71 ab 23.15 an 27.24 C 0.20	Blota, Kasbek, Caucasus.	F. Loewinson- Lessing.	F. Loewinson-Lessing, Mat. G. Russ., XXI, p. 107, 1901.	Andesite.	
71	II.4."3.3.	Q 12.78 di 8.21 or 23.35 hy 3.60 ab 26.20 mt 5.10 an 18.63 hm 1.82	Mount Pagos, Smyrna, Asia Minor.	H. S. Washing- ton.	H. S. Washington, A. J. S., III, p. 43, 1897.	Andesite.	In W. T., p. 231.
72	II.4."3.3.	Q 20.34 di 21.41 or 22.24 hy 2.19 ab 16.77 mt 1.16 an 14.46 il 0.61	Tatarka River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 148, 1910.	Banatite.	
73	II.4.3.3.⊙	Q 16.80 di 6.31 or 16.68 hy 14.28 ab 20.96 mt 1.16 an 22.52 il 0.46	Tatarka River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 143, 1910.	Banatite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
74	61.36	15.38	2.51	3.76	3.44	7.12	2.85	2.72	0.59				0.12		99.85	2.784
A3. III	1.023	.151	.016	.052	.086	.127	.046	.029					.002			
75	60.78	17.63	3.82	2.18	2.25	5.75	2.86	2.56	1.38	0.24	0.62	0.06			100.13	
A2. II	1.013	.173	.024	.030	.056	.103	.046	.028			.008	—				
76	66.58	14.36	1.53	3.19	1.70	4.18	3.09	3.37	0.79	0.17	0.65	0.10	0.07	CO ₂ 0.04 ZrO ₂ none Cl none S none Cr ₂ O ₃ none NiO none BaO 0.04 SrO trace V ₂ O ₅ trace	99.86	2.718
A1. I	1.110	.141	.009	.044	.043	.075	.050	.036			.008	.001	.001			
77	66.06	15.25	1.10	3.69	2.27	4.86	2.16	2.77	0.94	0.30	0.70	0.11	0.02	CO ₂ 0.07 ZrO ₂ 0.03 SO ₃ none Cl 0.01 S 0.06 Cr ₂ O ₃ none V ₂ O ₅ 0.03 NiO 0.02 BaO 0.06 SrO trace Cu ₂ Pb trace	100.51	2.726
A1. I	1.101	.150	.007	.051	.057	.087	.035	.030			.009	.001	—			
78	65.94	15.10	1.20	2.34	2.53	4.48	3.09	3.73	0.80	0.11	0.55	0.21	0.04	CO ₂ 0.12 ZrO ₂ none Cl, F none S none Cr ₂ O ₃ none NiO trace BaO 0.13	100.37	2.725
A1. I	1.099	.148	.008	.032	.063	.080	.050	.039			.007	.001	—			
79	64.04	15.58	0.80	4.47	2.64	3.52	2.42	2.80	2.25	0.38	0.80	0.18	trace	CO ₂ none Cl trace S none Li ₂ O trace	99.88	2.722
A2. II	1.067	.153	.005	.063	.066	.063	.039	.030			.010	.001	—			
80	62.54	16.66	1.04	5.54	2.68	3.92	2.66	2.47	0.46	0.17	1.20	0.20	trace	CO ₂ none Cl trace S none Li ₂ O trace	99.54	2.781
A2. II	1.042	.163	.006	.077	.067	.070	.043	.027			.015	.001	—			
81	63.27	16.50	0.68	5.10	2.48	4.18	2.36	2.68	0.52	0.09	1.30	0.15	0.03	CO ₂ none S 0.16	99.50	2.76
A2. II	1.055	.162	.004	.071	.062	.075	.038	.029			.016	.001	—			
82	65.65	14.27	1.52	3.96	2.62	3.30	2.22	4.01	1.18	0.12	0.66	0.28	0.06	CO ₂ none	99.85	
A2. II	1.094	.140	.019	.055	.066	.059	.035	.043			.008	.002	—			
83	61.77	16.48	2.38	3.08	3.03	5.80	1.46	3.72	1.73		0.75		0.15		100.35	
A2. II	1.030	.162	.015	.043	.076	.104	.024	.039			.009		.002			
84	58.20	18.35	1.44	3.46	3.49	6.20	2.63	2.96	2.05		0.87		0.35	CO ₂ none	100.00	
A2. II	.970	.180	.009	.048	.087	.111	.042	.032			.011		.005			
85	60.96	16.62	3.87	2.61	0.95	6.35	3.01	3.40	1.03	0.18	0.50	0.25	trace	CO ₂ 0.10 Cl trace S trace Cr ₂ O ₃ 0.04 BaO none SrO none Li ₂ O none	99.87	2.54
A1. I	1.016	.163	.024	.036	.024	.114	.048	.036			.006	.002	—			
86	57.46	15.95	1.96	5.82	3.77	7.26	2.28	2.82	1.60		1.15	0.19			99.76	
A2. II	.958	.156	.012	.081	.094	.130	.087	.024			.014	.001				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. HARZOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
74	II.4.3.3(4).	Q 15.00 di 11.47 or 16.12 hy 7.54 ab 24.10 mt 3.71 an 21.13	Atar Volcano, Sumatra.	L. Serrurier.	R. D. M. Verbeek, Sum. Westk., p. 232, 1883.	Quartz diorite.	Not in W. T.
75	(I)II.4.3''.3(4).	Q 18.66 di 0.86 or 15.57 hy 5.20 ab 24.10 mt 5.10 an 27.52 il 1.22 hm 0.32	Bulu-Nipis, Batak Land, Sumatra.	M. Dittrich.	H. Stegmann, N. J. B. B., XXVII, p. 420, 1909.	Quartz trachyte- andesite.	
76	(I)II.4.(2)3.3''.	Q 23.76 di 3.89 or 20.02 hy 6.07 ab 26.20 mt 2.09 an 15.29 il 1.22 ap 0.34	Kybean Road, Bega, New South Wales.	Not stated.	Dep. Mines, N. S. W. A. R. (1908), p. 184, 1909.	Granite.	
77	(I)II.''4.3''.3.	Q 27.06 hy 10.32 or 16.68 mt 1.62 ab 18.34 il 1.37 an 23.35 ap 0.34 C 0.10	Wombeyan Road, Wollondilly River, New South Wales.	J. C. H. Min- gaye.	G. W. Card, Rec. G. S. N. S. W., VIII, (3), p. 261, 1907.	Dacite.	
78	(I)II.4.(2)3.3.	Q 20.34 di 4.02 or 21.68 hy 6.62 ab 26.20 mt 1.86 an 16.40 il 1.06 ap 0.34	Kiama, New South Wales.	Not stated.	Dep. Mines, N. S. W. A. R. (1909), p. 198, 1910.	Granite.	
79	''II.''4.3.3.	Q 25.14 hy 12.94 or 16.68 mt 1.16 ab 20.44 il 1.52 an 16.68 ap 0.34 C 2.45	Braemar House, Macedon, Victoria.	R. J. Lewis.	Skeats and Summers, G. S. Vict. B. 24, p. 20, 1912.	Granodiorite.	
80	II.4.3.3(4).	Q 21.99 hy 14.14 or 15.01 mt 1.39 ab 22.53 il 2.23 an 18.63 ap 0.34 C 2.65	Braemar House, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 17, 1912.	Dacite.	
81	''II.4.3.3''.	Q 23.76 hy 12.93 or 16.12 mt 0.93 ab 19.91 il 2.43 an 20.02 ap 0.34 C 2.35	Upwey, Mount Dandenong, Victoria.	H. C. Richards.	H. C. Richards, Pr. R. Soc. Vict., XXI (2), p. 533, 1909.	Dacite.	
82	''II.4.(2)3.3.	Q 25.68 hy 10.30 or 23.91 mt 4.41 ab 18.34 il 1.22 an 14.46 ap 0.67 C 1.02	Mahikinui, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Granodiorite.	
83	(I)II.4.3(4).(2)3.	Q 21.12 di 1.11 or 21.68 hy 9.34 ab 12.58 mt 3.48 an 27.52 il 1.37	Ramarana Creek, n. Whiritoa, Hauraki, New Zealand.	Not stated.	Bell and Fraser, G. S. N. Z. B. 15, p. 45, 1912.	Andesite.	
84	''II.4(5).(2)3.3''.	Q 11.34 di 1.11 or 17.79 hy 12.52 ab 22.01 mt 2.09 an 29.47 il 1.67	St. Pauls, Whangaroa, New Zealand.	J. S. MacLaurin.	Bell and Clarke, N. Z. G. S. B. 8, p. 68, 1909.	Andesite.	
85	(I)II.4.3.3''.	Q 17.76 di 6.24 or 20.02 hy 0.20 ab 25.15 mt 5.57 an 21.96 il 0.91 ap 0.67	Wai Mahikoliko, Espiritu Santo Island, New Hebrides.	D. Mawson.	D. Mawson, Pr. Linn. Soc. N. S. W., XXX, p. 470, 1905.	Andesite.	
86	II.4''.3(4).3(4).	Q 13.26 di 7.29 or 13.34 hy 13.08 ab 19.39 mt 2.78 an 26.41 il 2.13 ap 0.34	Hovgaard Island, Weddell Quadrant, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Quartz diorite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	59.03	13.16	none	7.02	5.50	6.75	2.47	1.43	2.86		1.19	0.13		CO ₂ 0.25	99.79	
A2. ? II	.984	.129	—	.097	.138	.121	.040	.015			.015	.001				
2	63.22	17.46	1.35	3.40	2.05	4.91	5.12	1.31	0.60		0.74	0.07		FeS ₂ 0.44	100.67	
A2. II	1.054	.171	.008	.047	.051	.088	.082	.014			.009	—				
3	63.44	18.84	0.16	4.05	1.99	4.23	4.35	2.07	0.33	0.06	1.41	0.32		CO ₂ none	101.25	
B2. III	1.057	.185	.001	.057	.050	.075	.070	.022			.018	.002				
4	61.40	16.59	2.13	3.05	2.73	6.17	3.83	1.34	0.88	0.82	0.79	0.20	0.13	CO ₂ none ZrO ₂ none S none Cr ₂ O ₃ trace V ₂ O ₅ 0.02 BaO 0.02 SrO trace	100.10	
A1. I	1.023	.163	.013	.042	.063	.110	.061	.015			.010	.001	.002			
5	56.78	14.33	5.76	9.27	1.58	5.26	3.43	1.75	0.10	0.33	1.44	0.36	0.25		100.64	
A2. II	.946	.140	.036	.129	.040	.094	.055	.019			.018	.003	.004			
6	64.26	15.88	2.74	1.44	2.80	7.44	3.43	0.77	0.50	0.15	0.45	0.16	0.02	ZrO ₂ 0.02 S trace BaO none	100.06	
A1. I	1.071	.156	.017	.020	.070	.133	.055	.008			.006	.001	—			
7	66.68	14.93	1.58	3.32	2.19	4.89	2.65	2.05	1.09	0.16	0.50	0.10	0.10	BaO 0.08 SrO trace Li ₂ O trace	100.32	
A2. II	1.111	.146	.010	.046	.055	.088	.043	.022			.006	.001	.001			
8	63.61	15.70	1.98	3.81	3.58	4.50	3.47	2.12	0.97	0.14	0.40	0.15	0.05	CO ₂ trace S trace	100.48	
A2. II	1.060	.154	.012	.053	.090	.080	.056	.022			.005	.001	—			
9	56.61	14.89	1.04	4.32	4.05	4.94	3.19	1.51	1.58	0.08	7.26	0.26	0.01	CO ₂ 0.22 S 0.03	99.94	
A2. II	.944	.146	.007	.060	.101	.088	.051	.016			.091	.002	—			
10	54.80	14.28	3.08	7.55	2.52	6.57	2.61	2.00	1.23	0.16	4.15	0.70	0.02	CO ₂ trace S 0.02	99.69	
A2. II	.913	.140	.019	.105	.063	.118	.042	.021			.052	.005	—			
11	50.97	13.13	1.44	5.42	4.68	3.66	2.72	2.24	1.41	0.05	13.64	0.31	0.05		99.76	
A2. II	.850	.129	.009	.075	.117	.065	.044	.023			.171	.002	—			
12	61.19	15.22	3.20	3.55	2.38	7.94	3.17	2.62	0.40				trace		99.67	
A3. III	1.020	.149	.020	.050	.060	.142	.051	.027					—			
13	60.32	15.80	5.42	0.89	5.08	4.65	4.09	1.82	1.67			0.12			99.86	
A3. III	1.005	.155	.034	.012	.127	.083	.066	.020				.001				
14	64.09	16.20	2.61	2.40	2.06	4.51	3.88	2.51	0.44	0.22	0.49	0.24	0.09	BaO 0.15 SrO 0.03	99.92	
A1. I	1.068	.159	.016	.033	.052	.080	.063	.027			.006	.002	.001			
15	60.19	17.39	2.04	4.28	2.10	5.69	3.30	2.67	0.89	0.31	0.85	0.30	0.11	CO ₂ 0.21 ZrO ₂ 0.04 SO ₃ none S none BaO 0.08 SrO 0.02	100.47	
A1. I	1.003	.170	.013	.060	.053	.102	.053	.029			.011	.020	.002			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	II''4.3''4.	Q 14.52 di 10.01 or 8.34 hy 19.71 ab 20.96 il 2.28 an 20.57 ap 0.34	Ivigsarkut, Disko, Greenland.	M. Dittrich.	T. Nicolau, Medd. Gron., XXIV, p. 243, 1900.	Andesite.	Iron bearing. NOFe ₂ O ₃ ? Not in W. T.
2	(I)II.4''3.4(5).	Q 14.04 di 2.97 or 7.78 hy 7.60 ab 42.97 mt 1.86 an 20.85 il 1.37 pr 0.44	Reindeer Point, Foulke Fjord, Ellesmere Land.	P. Schei.	C. Bugge, 2d Fram. Exp., No. 22, p. 18, 1910.	Quartz diorite.	
3	(I)II.4.''3.4.	Q 16.86 hy 10.02 or 12.23 mt 0.23 ab 36.68 il 2.74 an 18.90 ap 0.67 C 2.55	Southport Island, Boothbay quadrangle, Maine.	M. W. Adams.	I. H. Ogilvie, Ann. N. Y. Ac. Sci., XVII, p. 536, 1907.	Quartz diorite.	
4	''II.4.3.4.	Q 17.34 di 4.48 or 8.34 hy 6.91 ab 31.96 mt 3.02 an 24.19 il 1.52 ap 0.34	Edmunds Hill, Aroostook County, Maine.	W. F. Hille- brand.	H. E. Gregory, A. J. S., VIII, p. 365, 1899.	Andesite.	Also in U. S. G. S. B. 165, p. 171, 1900. In W. T., p. 231.
5	II.4.3.4.⊙	Q 13.98 di 4.27 or 10.56 hy 12.24 ab 28.82 mt 8.35 an 18.35 il 2.74 ap 1.01	Rocky Hill, New Jersey.	A. H. Phillips.	A. H. Phillips, A. J. S., VIII, p. 279, 1899.	Diabase.	In W. T., p. 231.
6	''II.4.3(4).4(5).	Q 23.82 di 8.64 or 4.45 hy 3.00 ab 28.82 mt 3.25 an 25.85 il 0.91 hm 0.48	Devault, Pennsylvania.	R. C. Wells.	F. Bascom, U. S. G. S. rec. lab.	Quartz diorite. gneiss.	
7	(I)II.''4.3.''4.	Q 28.26 di 1.19 or 12.23 hy 8.90 ab 22.53 mt 2.32 an 22.52 il 0.91 ap 0.34	Rowlandsville, Cecil County, Maryland.	W. F. Hille- brand.	G. H. Williams, U. S. G. S. A. R. 15, p. 672, 1895.	Granite.	Also in F. Bascom, Md. G. S., Cecil County, p. 120, 1902. In W. T., p. 231.
8	''II.4.3.4.*	Q 18.84 hy 13.75 or 12.23 mt 2.78 ab 29.34 il 0.76 an 21.13 ap 0.34	Rose's mill, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 76, 1913.	Hornblende syenite.	
9	II.4.3.4.⊙	Q 16.86 di 0.43 or 8.90 hy 9.90 ab 26.72 il 9.12 an 21.96 hm 1.04 ru 2.43 ap 0.67	Roseland, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 76, 1913.	Hornblende syenite.	
10	II.4.3.''4.	Q 15.60 di 5.44 or 11.68 hy 8.13 ab 22.01 mt 4.41 an 21.41 il 7.90 ap 1.68	Roseland, Virginia.	W. H. Thorn- ton.	Watson and Taber, U. S. G. S. B. 430, p. 208, 1910.	Gabbro.	
11	II''4.3.(3)4.	Q 12.90 hy 11.70 or 12.79 il 11.40 ab 23.06 hm 1.44 an 16.12 ru 7.68 C 0.41 ap 0.67	Roseland, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 76, 1913.	Hornblende syenite.	
12	II.4.3.(3)4.	Q 14.94 di 16.11 or 15.01 hy 2.09 ab 26.72 mt 4.64 an 19.74	St. Cloud, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, G. N. H. S. Minn. B. 2, p. 86, 1887.	Gabbro.	Light portion. Cf. No. 4, II.4.3.3. In W. T., p. 231.
13	II.4''3.4.	Q 12.78 di 2.38 or 11.12 hy 11.60 ab 34.58 mt 2.73 an 19.18 hm 3.52 ap 0.34	Epsilon Lake, Lake County, Minnesota.	J. A. Dodge.	U. S. Grant, G. N. H. S. Minn. A. R. 21, p. 58, 1893.	Porphyrite.	In W. T., p. 231.
14	(I)II.4.''3.4.	Q 19.32 di 0.89 or 15.01 hy 6.35 ab 33.01 mt 3.71 an 19.18 il 0.91 ap 0.67	Haystack Stock, Park County, Montana.	G. Steiger.	W. H. Emmons, J. G., XVI, p. 210, 1908.	Granodiorite porphyry.	
15	''II.4''3.(3)4.	Q 14.22 di 1.61 or 16.12 hy 9.52 ab 27.77 mt 3.02 an 24.46 il 1.67 ap 0.67	Cable, Phillipsburg quadrangle, Montana.	G. Steiger.	Emmons and Calkins, U. S. G. S. P. P. 78, p. 96, 1913.	Granodiorite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
16	57.98	17.01	3.34	3.34	2.74	7.35	3.92	2.02	0.49	0.14	0.90	0.43	0.12	NiO BaO SrO	trace 0.06 0.02	99.86	
A1. I	.966	.167	.021	.046	.069	.131	.063	.021			.011	.003	.002				
17	59.48	16.37	3.21	3.17	3.29	4.88	3.30	2.81	2.01		0.93	0.41	0.19	Cr ₂ O ₃ NiO BaO	0.03 trace 0.13	100.21	
A1. I	.991	.160	.020	.044	.082	.087	.053	.030			.012	.003	.003				
18	56.61	17.91	4.22	2.70	2.21	6.88	3.10	2.71	1.16	0.29	0.71	0.46	0.58	CO ₂ S BaO	0.13 0.03 0.14	99.84	
A1. I	.994	.176	.026	.038	.055	.123	.050	.029			.009	.003	.008				
19	57.78	16.28	1.02	4.92	4.60	6.65	3.25	2.22	0.92	0.34	1.07	0.30	0.15	CO ₂ S NiO BaO SrO	0.15 0.02 0.02 0.12 0.07	99.88	
A1. I	.963	.160	.006	.068	.115	.119	.052	.023			.013	.002	.002				
20	65.11	16.21	1.06	3.19	2.57	3.97	4.00	2.51	0.94		0.71	0.02	none	SO ₂ Cl Li ₂ O	trace none 0.04	100.33	
A2. II	1.085	.139	.007	.044	.064	.071	.064	.027			.009	—	—				
21	64.07	15.82	3.40	1.44	3.39	4.43	4.06	2.27	0.42	0.10	0.45	0.18	trace	NiO	0.05	100.08	
A2. II	1.068	.155	.021	.020	.085	.079	.065	.024			.005	.001	—				
22	61.22	16.14	3.01	2.58	4.21	5.46	4.48	1.87	0.40	0.04	0.61	0.25	trace	NiO	0.09	100.36	
A2. II	1.020	.158	.019	.036	.105	.098	.072	.020			.008	.002	—				
23	58.49	16.70	3.85	2.37	3.12	5.90	3.47	1.59	2.44		1.71	trace	0.24	SO ₂ Li ₂ O	0.63 0.01	100.52	
A2. II	.975	.164	.024	.033	.078	.105	.056	.017			.021	—	.003				
24	56.28	14.23	4.69	4.05	6.37	7.94	2.98	1.23	0.93		0.84	0.40	0.16	SO ₂ Cl Li ₂ O	trace 0.17 0.01	100.28	
A2. II	.938	.140	.029	.056	.159	.142	.048	.013			.010	.003	.002				
25	60.30	16.31	4.35	1.41	2.39	5.62	3.99	2.36	1.86	0.64	0.76	0.20	0.13	SO ₂ BaO	0.10 0.15	100.57	
A1. I	1.005	.160	.027	.020	.060	.100	.064	.025			.010	.001	.002				
26	56.61	13.62	5.89	2.60	5.48	6.61	3.13	2.71	1.07	1.20	0.79	0.06	0.35	Cr ₂ O ₃ BaO SrO	0.05 0.14 trace	100.31	
A1. I	.944	.134	.037	.036	.137	.118	.050	.029			.010	—	.005				
27	55.83	17.11	4.07	3.75	5.05	7.40	2.94	1.71	1.28		1.05	0.21	none	SO ₂ Cl Li ₂ O	trace none none	100.40	
A2. II	.931	.168	.025	.052	.126	.132	.047	.018			.013	.001	—				
28	63.76	16.01	2.22	1.96	2.43	4.55	3.98	2.84	0.57	0.28	0.52	0.25	0.09	CO ₂ Cl NiO BaO SrO	0.23 trace none 0.17 0.09	99.95	
A1. I	1.063	.157	.014	.028	.061	.081	.065	.030			.006	.002	.001				
29	61.45	15.07	4.46	1.18	3.02	5.37	4.00	1.22	1.23		2.80	trace	none	SO ₂ Li ₂ O	0.29 0.05	100.14	
A2. II	1.024	.148	.028	.017	.076	.096	.064	.013			.034	—	—				
30	61.16	16.17	2.89	2.18	3.89	4.26	3.87	3.20	2.09		0.23	0.13	trace				
A2. II	1.019	.139	.018	.030	.097	.076	.062	.034			.003	.001	—				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	II.4(5).3.4.	Q 10.44 di 8.53 or 11.68 hy 4.89 ab 33.01 mt 4.87 an 23.07 il 1.67 ap 1.01	Haystack Stock, Park County, Montana.	G. Steiger.	W. H. Emmons, J. G., XVI, p. 212, 1908.	Quartz diorite.	
17	"II.4".3.(3)4.	Q 14.52 hy 10.18 or 16.68 mt 4.64 ab 27.77 il 1.82 an 21.41 ap 1.01	Near Red Bluff, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 651, 1895.	Andesite.	Complete in U. S. G. S. B. 148, p. 140, 1897. In W. T., p. 233.
18	"II.4(5).3.(3)4.	Q 11.64 di 3.56 or 16.12 hy 5.26 ab 26.20 mt 6.03 an 26.97 il 1.37 ap 1.01	Keating mine, Radersburg, Montana.	C. Palmer.	A. N. Winchell, U. S. G. S. rec. lab.	Andesite.	
19	II.4(5).3.4.	Q 9.30 di 6.09 or 12.79 hy 15.28 ab 27.25 mt 1.39 an 23.63 il 1.98 ap 0.67	Croesus mine, Hailey, Idaho.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. A. R. 20, III, p. 81, 1900.	Diorite.	In W. T., p. 273.
20	(I)II.4."3.4.	Q 18.48 di 0.68 or 15.01 hy 9.76 ab 33.54 mt 1.62 an 18.90 il 1.37	Electric Peak, Yellowstone National Park.	J. F. Whitfield.	J. P. Iddings, U. S. G. S. A. R. 12, (I), p. 627, 1891.	Quartz diorite.	Also in U. S. G. S. Mon. 32, II, p. 116, 1899. In W. T., p. 233.
21	(I)II.4."3.4.	Q 18.42 di 2.16 or 13.34 hy 7.50 ab 34.06 mt 3.48 an 18.35 il 0.76 hm 0.96 ap 0.34	Electric Peak, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, U. S. G. S. A. R. 12, I, p. 627, 1891.	Quartz diorite.	Also in U. S. G. S. Mon. 32, II, p. 116, 1899. In W. T., p. 233.
22	II.4(5)."3.4.	Q 11.82 di 5.46 or 11.12 hy 9.82 ab 37.73 mt 4.41 an 18.35 il 1.28 ap 0.67	Electric Peak, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, U. S. G. S. A. R. 12, II, p. 627, 1891.	Diorite.	Also in U. S. G. S. Mon. 32, II, p. 116, 1899. In W. T., p. 233.
23	II.4.3.4.⊙	Q 15.78 di 3.03 or 9.45 hy 6.40 ab 29.34 mt 5.57 an 25.30 il 3.19	Electric Peak, Yellowstone, National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, II, p. 81, 1899.	Porphyrite.	In W. T., p. 233.
24	II"4".3"4.	Q 11.04 di 11.61 or 7.23 hy 12.82 ab 25.15 mt 6.73 an 21.96 il 1.67 ap 1.01	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, II, p. 116, 1899.	Diorite.	In W. T., p. 233.
25	"II.4".3.4.	Q 14.58 di 5.62 or 13.90 hy 3.40 ab 33.54 mt 2.78 an 19.74 il 1.52 hm 2.40 ap 0.34	Sepulcher Mountain, Yellowstone National Park.	T. M. Chatard.	J. P. Iddings, U. S. G. S. A. R. 12, I, p. 648, 1891.	Andesite.	Also in U. S. G. S. Mon. 32, II, p. 135, 1899. In W. T., p. 233.
26	II"4(5)."3.(3)4.	Q 9.60 di 13.61 or 16.12 hy 7.40 ab 26.20 mt 7.19 an 15.29 il 1.52 hm 0.96	Sepulcher Mountain, Yellowstone National Park.	T. M. Chatard.	J. P. Iddings, U. S. G. S. A. R. 12, I, p. 648, 1899.	Andesite.	Also in U. S. G. S. Mon. 32, II, p. 135, 1899. In W. T., p. 233.
27	II.4(5).3(4).4.	Q 10.14 di 5.72 or 10.01 hy 11.75 ab 24.63 mt 5.80 an 28.63 il 1.98 ap 0.36	Sepulcher Mountain, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. A. R. 12, I, p. 648, 1891.	Andesite.	Also in U. S. G. S. Mon. 32, II, p. 135, 1899. In W. T., p. 233.
28	(I)II.4.(2)3."4.	Q 17.28 di 2.65 or 16.68 hy 5.89 ab 34.06 mt 0.91 an 17.24 il 3.25 ap 0.67	Needle Mountain, Yellowstone National Park.	W. F. Hille- brand.	Hague and Jaggar, U. S. G. S. B. 168, p. 96, 1900.	Diorite.	In W. T., p. 187.
29	II.4.3.4".	Q 19.14 di 1.73 or 7.23 hy 6.80 ab 33.54 il 2.58 an 19.74 hm 4.46 tn 3.33	Agate Creek, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. B. 148, p. 134, 1897.	Andesite.	In W. T., p. 233.
30	"II 4(5).(2'3."4.	Q 12.06 di 2.19 or 18.90 hy 10.66 ab 32.49 mt 4.18 an 17.51 il 0.46 ap 0.34	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 II, p. 261, 1899.	Andesite porphyry.	In W. T., p. 233.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
31	60.15	17.85	2.00	2.02	3.26	5.48	3.95	2.36	1.24	0.25	0.47	0.22	0.07	CO ₂ none Cr ₂ O ₃ none NiO none BaO 0.20 SrO 0.10 Li ₂ O none	99.62	
A1. I	1.003	.175	.013	.028	.082	.098	.064	.025			.007	.002	.001			
32	60.00	16.37	2.28	2.46	3.81	4.96	3.73	2.70	1.42	0.61	0.59	0.35	0.05	CO ₂ 0.17 NiO none BaO 0.26 SrO 0.11 Li ₂ O trace	99.87	
A1. I	1.000	.160	.014	.034	.095	.089	.059	.029			.007	.002	—			
33	62.71	17.06	3.79	2.74	1.78	5.51	3.54	2.96	0.24				trace		100.33	2.79
A3. III	1.045	.167	.024	.038	.045	.098	.057	.032								30°
34	60.69	15.90	4.52	1.72	1.93	5.23	3.55	3.22	0.96	0.93	0.73	0.31	0.13	CO ₂ 0.27 NiO none BaO 0.10 SrO 0.03	100.22	
A1. I	1.012	.156	.028	.024	.048	.093	.057	.034			.009	.002	.002			
35	59.42	16.79	3.23	3.29	2.24	5.57	4.15	2.82	0.79	0.27	0.68	0.35	0.13	CO ₂ 0.44 BaO 0.14 SrO 0.07 Li ₂ O trace	100.38	
A1. I	.990	.164	.020	.046	.056	.100	.067	.030			.008	.002	.002			
36	59.19	18.00	3.07	2.32	1.41	6.55	4.01	2.74	1.06	0.46	0.58	0.29	0.19	BaO 0.18 SrO 0.13 Li ₂ O trace	100.18	
A1. I	.970	.176	.020	.032	.034	.117	.064	.029			.007	.002	.003			
37	58.88	15.93	3.12	2.94	2.30	6.05	3.17	1.86	2.48	1.66	0.73	0.34	0.16	ZrO ₂ 0.02 Fe ₂ O ₃ 0.07 BaO 0.12 SrO 0.14 Li ₂ O trace	99.97	
A1. I	.981	.156	.019	.041	.058	.108	.052	.020			.009	.002	.002			
38	60.00	18.10	1.75	3.77	2.41	5.30	3.36	2.10	0.73	0.76	0.93	0.63	0.13	CO ₂ trace ZrO ₂ 0.02 S 0.02 BaO 0.09 SrO 0.01	100.11	
A1. I	1.000	.177	.011	.053	.080	.095	.054	.022			.012	.004	.002			
39	57.28	17.55	4.07	3.96	2.08	6.61	3.54	2.00	0.66	0.94	0.81	0.38	0.16	CO ₂ none ZrO ₂ none S 0.01 Cr ₂ O ₃ none V ₂ O ₅ 0.01 BaO 0.08 SrO 0.05	100.19	
A1. I	.955	.172	.025	.055	.052	.118	.057	.021			.010	.003	.002			
40	56.93	17.03	3.67	4.54	3.30	6.51	3.19	2.58	0.45	0.13	1.03	0.44	0.10	CO ₂ none SO ₃ none Cl trace BaO 0.08 SrO 0.06 Li ₂ O none	100.04	2.860
A1. I	.949	.167	.023	.063	.083	.116	.050	.027			.013	.003	.001			33°
41	56.19	16.12	4.92	4.43	4.60	7.00	2.96	2.37	1.03			0.27	trace	Cl 0.02	99.91	2.742
A3. III	.937	.158	.031	.061	.115	.125	.048	.025				.002	—			
42	63.16	17.21	2.43	2.30	1.27	6.27	4.70	1.84	0.69		0.21	0.12	trace	SO ₃ trace BaO 0.09 SrO trace Li ₂ O trace	100.29	
A2. II	1.053	.169	.015	.032	.032	.112	.076	.020			.003	.001	—			
43	62.88	17.13	1.86	2.58	1.48	5.39	4.50	2.25	0.42	0.16	0.51	0.26	0.16	BaO 0.16 SrO 0.12 Li ₂ O trace	99.86	
A1. I	1.048	.168	.012	.036	.037	.096	.072	.024			.006	.002	.002			
44	62.10	15.47	2.64	3.15	2.57	5.31	3.56	3.15	0.72	0.14	0.81	0.27		CO ₂ trace	99.89	2.72
A2. II	1.035	.152	.016	.044	.064	.095	.057	.034			.010	.002				
45	60.42	17.27	2.60	3.47	2.30	6.36	3.14	2.34	0.86	0.40	0.83	0.20	0.13	CO ₂ none ZrO ₂ none SO ₃ none S 0.05 BaO 0.03 SrO 0.06	100.46	
A1. I	1.007	.169	.016	.049	.058	.114	.051	.025			.010	.002	.002			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
31	(I)II.4(5).3.4.	Q 12.06 di 1.08 or 13.90 hy 8.89 ab 33.54 mt 3.02 an 23.91 il 1.06 ap 0.67	Wind River Plateau, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggar, U. S. G. S. B. 168, p. 97, 1900.	Andesite.	In W. T., p. 233.
32	"II.4".3."4.	Q 12.60 di 2.19 or 16.12 hy 10.18 ab 30.92 mt 3.25 an 20.02 il 1.06 ap 0.67	Cabin Creek, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggar, U. S. G. S. B. 168, p. 96, 1900.	Diorite porphyry.	In W. T., p. 233.
33	(I)II.4.3.(3)4.	Q 16.44 di 4.02 or 17.79 hy 4.44 ab 23.87 mt 5.57 an 22.24	Brush Creek, Elk Mountains, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 150, p. 242, 1898.	Diorite.	In W. T., p. 235.
34	(I)II.4."3.(3)4.	Q 16.38 di 3.24 or 18.90 hy 3.30 ab 29.87 mt 3.94 an 18.07 il 1.37 hm 1.76 ap 0.67	Pinnacle Ridge, Ouray quad- rangle, Colorado.	G. Steiger.	Cross and Howe, U. S. G. S. Fol. 153, p. 12, 1907.	Quartz latite.	
35	"II.4(5)."3.4.	Q 10.32 di 5.88 or 16.68 hy 5.38 ab 35.11 mt 4.64 an 18.63 il 1.22 ap 0.67	Ute Peak, Sierra El Late, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 14, II, p. 227, 1894.	Porphyrite.	In W. T., p. 233.
36	(I)II.4(5).3."4.	Q 10.62 di 5.99 or 16.12 hy 1.60 ab 33.54 mt 4.64 an 23.07 il 1.06 ap 0.67	Lone Cone, San Miguel Mountains, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 14, II, p. 227, 1894.	Diorite.	In W. T., p. 233.
37	"II.4.3.4.	Q 17.46 di 3.77 or 11.12 hy 5.98 ab 27.25 mt 4.41 an 23.35 il 1.37 ap 0.67	Edith Mountain, Silverton, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. Fol. 120, p. 9, 1905.	Andesite.	
38	"II.4.3.4.	Q 17.40 hy 10.22 or 12.23 mt 2.55 ab 28.30 il 1.82 an 22.52 ap 1.34 C 2.04	Red Mountain, San Cristobal quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. rec. lab.	Diorite.	
39	"II.4".3.4.	Q 12.66 di 3.16 or 11.68 hy 6.58 ab 29.87 mt 5.80 an 26.13 il 1.52 ap 1.01	Woodbine Creek, San Cristobal quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. rec. lab.	Andesite.	
40	II.4(5).3.(3)4.	Q 10.80 di 3.59 or 15.01 hy 10.27 ab 26.20 mt 3.34 an 25.02 il 1.98 ap 1.01	Ophir Needles, Telluride, Colorado.	H. N. Stokes.	W. Cross, U. S. G. S. Fol. 57, p. 6, 1899.	Diorite- monzonite.	In W. T., p. 235.
41	II.4(5).3."4.	Q 9.06 di 7.42 or 13.90 hy 11.87 ab 25.15 mt 7.19 an 23.63 ap 0.67	Buffalo Peaks, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 1, p. 26, 1883.	Hypersthene andesite.	Also in A. J. S., XXV, p. 142, 1883. In W. T., p. 277.
42	(I)II.4"."3.4.	Q 14.34 di 8.13 or 11.12 hy 1.10 ab 39.82 mt 3.48 an 20.29 il 0.46 ap 0.34	Henry Mountains, Utah.	R. B. Riggs.	J. S. Diller, U. S. G. S. B. 148, p. 183, 1897.	Porphyry.	In W. T., p. 233.
43	(I)II.4"."3.4.	Q 15.24 di 3.87 or 13.34 hy 4.45 ab 37.73 mt 2.78 an 20.02 il 0.91 ap 0.67	Mount Hillers, Henry Mountains, Utah.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 14, II, p. 227, 1894.	Porphyrite.	In W. T., p. 233.
44	"II.4.(2)3.(3)4.	Q 15.48 di 6.02 or 18.90 hy 5.88 ab 29.87 mt 3.71 an 16.96 il 1.52 ap 0.67	Frisco District, Utah.	G. Steiger.	B. S. Butler, U. S. G. S. rec. lab.	Monzonite.	
45	"II.4.3."4.	Q 16.08 di 3.16 or 13.90 hy 7.57 ab 26.72 mt 3.71 an 25.85 il 1.52 ap 0.67	Kelvin, Ray District, Arizona.	G. Steiger.	F. L. Ransome, U. S. G. S. rec. lab.	Quartz diorite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
46	60.16	15.34	3.07	2.18	3.41	5.79	3.88	2.59	1.79	0.25	0.84	0.46	0.08	ZrO ₂ 0.01 SO ₂ 0.08 S trace NiO trace BaO 0.14 SrO 0.08	100.15	2.635
A1. I	1.003	.150	.020	.030	.085	.103	.063	.027			.011	.003	.001			21°
47	61.96	17.04	2.71	2.66	2.41	3.99	4.00	3.10	0.89	0.21	0.87	0.22	trace	CO ₂ none SO ₂ none Cl trace	100.06	2.59
A2. II	1.033	.167	.017	.037	.060	.071	.065	.033			.011	.002	—			
48	60.40	17.01	2.05	3.92	2.97	4.45	3.85	2.97	0.70	0.11	1.00	0.22		CO ₂ none Cl trace	99.65	2.75
A2. II	1.007	.167	.013	.054	.074	.080	.062	.032			.013	.002				
49	58.74	16.02	4.16	3.50	2.18	5.12	3.26	2.39	1.60	0.83	1.29	0.56	0.22	ZrO ₂ 0.05 FeS ₂ 0.11 BaO 0.10 SrO trace Li ₂ O trace	100.13	
A1. I	.979	.157	.026	.049	.055	.091	.053	.026			.016	.004	.003			
50	62.78	17.16	1.96	2.31	2.32	4.84	4.11	2.15	0.88	0.24	0.56	0.15	0.06	CO ₂ none Cl trace S 0.02 BaO 0.04 SrO trace Li ₂ O trace	99.58	
A1. I	1.046	.168	.013	.032	.058	.086	.066	.023			.007	.001	.001			
51	62.67	16.62	3.25	1.17	3.08	5.56	4.24	1.67	1.01	0.23	0.48	0.15	0.11	CO ₂ none ZrO ₂ 0.01 S none NiO 0.01 BaO 0.06 SrO 0.03	100.35	
A1. I	1.045	.163	.020	.017	.077	.099	.068	.018			.006	.001	.002			
52	61.31	16.70	1.30	4.08	3.44	6.10	4.05	1.58	0.36	0.22	0.73	0.18	0.14	CO ₂ none ZrO ₂ 0.01 S none NiO 0.02 BaO 0.05 SrO 0.02 Li ₂ O trace	100.29	
A1. I	1.022	.164	.008	.057	.086	.109	.066	.017			.009	.001	.002			
53	58.63	16.23	1.91	4.20	4.28	6.59	3.51	2.09	1.17	0.15	0.74	0.20	0.11	CO ₂ none FeS ₂ 0.04 NiO 0.02 BaO 0.06 SrO trace Li ₂ O trace	99.93	
A1. I	.977	.159	.012	.058	.107	.118	.037	.022			.009	.001	.002			
54	62.64	17.75	1.64	3.44	2.53	4.44	3.53	2.14	1.65		0.60	0.25	0.14		100.75	2.71
A2. II	1.044	.174	.010	.048	.063	.079	.056	.022			.008	.002	.002			
55	60.36	17.23	1.93	3.74	3.66	6.07	3.58	1.74	0.55	0.06	0.70	0.11	0.14	CO ₂ 0.08	99.95	2.757
A2. II	1.006	.169	.012	.052	.092	.109	.058	.019			.009	.001	.002			
56	58.36	18.38	0.53	5.30	2.60	7.20	3.15	1.98	0.80	0.10	0.54	0.12	0.14	CO ₂ 0.13 BaO 0.10 SrO trace	99.43	
A2. II	.973	.180	.003	.074	.065	.129	.051	.021			.007	.001	.002			
57	64.04	15.58	1.26	3.22	3.23	4.51	4.01	2.22	1.17	0.19	0.69	0.16	trace	CO ₂ none S trace NiO none BaO 0.11 SrO trace Li ₂ O trace	100.39	
A1. I	1.067	.153	.008	.044	.081	.080	.064	.023			.009	.001	—			
58	63.78	16.39	1.12	2.76	3.27	4.07	3.84	2.03	1.82	0.22	0.44	0.11	0.05	CO ₂ none S trace Cr ₂ O ₃ none NiO none BaO 0.08 SrO trace	99.98	
A1. I	1.063	.161	.007	.039	.082	.073	.062	.021			.005	.001	—			
59	63.37	15.90	1.41	3.18	3.33	4.63	4.05	2.10	1.16	0.18	0.69	0.17	trace	CO ₂ none S trace Cr ₂ O ₃ none NiO trace BaO 0.06 SrO none	100.23	
A1. I	1.056	.156	.009	.044	.084	.083	.065	.022			.009	.001	—			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
46	II.4''.(2)3.4.	Q 13.50 di 7.13 or 15.01 hy 5.20 ab 33.01 mt 4.64 an 16.68 il 1.67 ap 1.01	Sierra Grande, Colfax County, New Mexico.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 171, 1900.	Andesite.	In W. T., p. 235.
47	(I)II.4''.(2)3.''4.	Q 14.88 hy 7.19 or 18.35 mt 3.94 ab 34.06 il 1.67 an 17.79 ap 0.67 C 0.51	Kendrick Peak, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 131, 1913.	Dacite.	
48	''II.4(5).3.''4.	Q 11.70 hy 11.10 or 17.79 mt 3.02 ab 32.49 il 1.98 an 20.29 ap 0.67	Kendrick Peak, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 133, 1913.	Dacite.	
49	''II.4.3.''4.	Q 17.04 hy 6.82 or 14.46 mt 6.03 ab 27.77 il 2.43 an 21.68 ap 1.34	Near Pinal Peak, Globe District, Arizona.	W. F. Hille- brand.	F. L. Ransome, U. S. G. S. P. P. 12, p. 60, 1903.	Quartz diorite.	
50	(I)II.4.3.4.	Q 16.74 di 0.89 or 12.76 hy 7.08 ab 34.58 mt 3.02 an 21.96 il 1.06 ap 0.34	Yentna River, Alaska.	H. N. Stokes.	J. E. Spurr, A. J. S., X, p. 310, 1900.	Yentnite.	Scapolite pla- gioclase rock. In W. T., p. 235
51	(I)II.4.3.4.	Q 16.62 di 4.10 or 10.01 hy 6.00 ab 35.63 mt 2.55 an 21.41 il 0.91 hm 1.44 ap 0.34	Mount Drum, Copper River basin, Alaska.	W. F. Hille- brand.	W. C. Mendenhall, U. S. G. S. P. P. 41, p. 60, 1905.	Andesite.	
52	II.4''3.4.	Q 12.66 di 5.66 or 9.45 hy 11.12 ab 34.58 mt 1.86 an 22.62 il 1.37 ap 0.34	Mount Wrangell, Copper River basin, Alaska.	W. F. Hille- brand.	W. C. Mendenhall, U. S. G. S. P. P. 41, p. 59, 1905.	Andesite.	
53	II.4(5).3.4.	Q 10.32 di 5.62 or 12.23 hy 13.12 ab 29.87 mt 2.73 an 22.40 il 1.37 ap 0.34	Captains Bay, Unalaska Island, Alaska.	W. F. Hille- brand.	G. F. Becker, U. S. G. S. B. 148, p. 232, 1897.	Diorite.	In W. T., p. 235.
54	(I)II.4.3.4.	Q 20.22 hy 10.52 or 12.23 mt 2.32 ab 29.34 il 1.22 an 20.02 ap 0.67 C 2.45	Shoal Harbor, Saanich District, Vancouver Island, British Columbia.	M. F. Connor.	C. H. Clapp, Can. G. S. Mem. 36, p. 33, 1913.	Granodiorite.	
55	II.4''3.4.	Q 13.26 di 3.10 or 10.56 hy 12.03 ab 30.39 mt 2.78 an 25.58 il 1.37 ap 0.34	Chilliwalk, Batholith, Skagit Range, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 536, 1912.	Quartz diorite.	
56	II.4(5).3(4).4.	Q 10.56 di 4.18 or 11.68 hy 13.12 ab 26.72 mt 0.70 an 30.02 il 1.06 ap 0.34	Stemwinder Hill, Hedley District, British Columbia.	M. F. Connor.	C. Camself, Can. G. S. Mem. 2, p. 78, 1910.	Quartz diorite.	
57	''II.4.''3.4.	Q 17.58 di 2.48 or 12.79 hy 10.63 ab 33.54 mt 1.86 an 18.35 il 1.37 ap 0.34	Mount Stuart, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, U. S. G. S. Fol. 106, p. 5, 1904.	Granodiorite.	In W. T., p. 235.
58	''II.4.3.4.	Q 18.96 hy 11.76 or 11.68 mt 1.62 ab 32.45 il 0.76 an 19.46 ap 0.34 C 0.82	Mount Stuart, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, U. S. G. S. Fol. 106, p. 5, 1904.	Granodiorite porphyry.	In W. T., p. 235.
59	''II.4.3.4.	Q 16.56 di 2.69 or 12.23 hy 10.54 ab 34.06 mt 2.09 an 18.91 il 1.37 ap 0.34	Near Cascade Creek, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, U. S. G. S. Fol. 106, p. 5, 1904.	Granodiorite.	In W. T., p. 235.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
60	57.21	12.99	3.28	10.18	1.59	5.97	3.07	1.61	1.03	0.68	1.72	0.44	0.24	FeS ₂ 0.13 Cr ₂ O ₃ none V ₂ O ₅ none NiO trace BaO 0.06 SrO trace	100.20	
A1. I	.954	.127	.021	.141	.040	.107	.050	.017			.022	.003	.003			
61	53.35	12.90	2.64	11.28	2.68	6.96	2.83	1.40	1.76	0.91	2.44	0.45	0.25	FeS ₂ 0.13 Cr ₂ O ₃ none V ₂ O ₅ 0.04 NiO trace BaO 0.05 SrO trace	100.07	
A1. I	.889	.126	.016	.157	.067	.124	.045	.015			.031	.003	.004			
62	62.77	14.96	1.62	4.36	1.48	3.90	4.31	2.13	2.49	0.51	0.79	0.22	0.10	CO ₂ none ZrO ₂ 0.03 S none NiO none BaO 0.10 SrO none	99.77	
A1. I	1.046	.147	.010	.061	.037	.070	.069	.022			.010	.002	.001			
63	60.49	17.77	1.98	3.29	2.94	6.20	3.67	1.37	1.13	0.27	0.69	0.08	0.09	CO ₂ none S none NiO trace BaO 0.04 SrO 0.02	100.05	
A1. I	1.008	.175	.013	.046	.074	.111	.060	.015			.009	—	.001			
64	62.09	17.03	2.38	2.69	3.08	5.65	4.10	1.67	0.13	0.04	0.65	0.19	trace	CO ₂ none Cl trace S none Cr ₂ O ₃ none NiO none BaO 0.07 SrO 0.07 Li ₂ O none	99.84	
A1. I	1.035	.167	.015	.038	.077	.101	.066	.018			.008	.001	—			
65	60.98	17.82	1.83	3.33	2.76	5.73	4.26	1.43	0.45	0.13	0.71	0.17	trace	CO ₂ none Cl trace S none Cr ₂ O ₃ none NiO none BaO 0.06 SrO 0.05 Li ₂ O none	99.71	
A1. I	1.016	.174	.011	.046	.069	.102	.069	.015			.009	.001	—			
66	60.09	17.85	2.03	3.45	3.50	6.28	4.17	1.31	0.26	0.12	0.54	0.23	trace	CO ₂ none ZrO ₂ none Cl trace S none Cr ₂ O ₃ none NiO 0.05 BaO 0.05 SrO 0.05	99.98	
A1. I	1.002	.175	.013	.049	.088	.112	.068	.014			.008	.002	—			
67	59.39	18.45	1.79	3.90	3.13	6.29	4.29	1.29	0.42	0.10	0.41	0.22	trace	CO ₂ none ZrO ₂ none Cl trace S none Cr ₂ O ₃ none NiO none BaO 0.05 SrO 0.04	99.77	
A1. I	.990	.181	.011	.054	.078	.112	.069	.014			.005	.002	—			
68	58.41	17.85	2.67	3.29	3.61	6.81	3.77	1.23	0.86	0.34	0.69	0.24	trace	CO ₂ none Cl trace S none Cr ₂ O ₃ none NiO none BaO 0.05 SrO 0.05 Li ₂ O trace	99.87	
A1. I	.974	.175	.017	.046	.090	.121	.061	.013			.009	.002	—			
69	58.65	18.35	1.59	4.21	3.49	6.95	3.70	1.32	0.70	0.20	0.81	0.17	trace	CO ₂ none S none Cr ₂ O ₃ none BaO 0.06 SrO trace Li ₂ O none	100.20	
A1. I	.978	.180	.010	.058	.087	.124	.060	.014			.010	.001	—			
70	59.61	15.98	1.12	5.42	5.04	5.54	3.68	1.10	1.14	0.20	0.65	0.14	0.21	NiO 0.05 BaO 0.04	99.92	
A2. II	.994	.157	.007	.075	.126	.099	.060	.012			.008	.001	.003			
71	57.49	17.22	4.34	3.01	3.38	6.48	3.90	1.30	1.37	0.62	1.12	0.28	0.22	BaO trace	100.73	
A2. II	.958	.169	.027	.042	.084	.116	.063	.014			.014	.002	.003			
72	63.03	17.72	2.27	1.92	3.63	5.97	3.92	1.06	0.44							99.96
A3. III	1.051	.174	.014	(.026)	.091	.107	.063	.012								

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
60	II'' 4.3.4.	Q 15.24 di 8.83 or 9.45 hy 12.80 ab 26.20 mt 4.87 an 16.68 il 3.34 ap 1.01	Turnpike Creek, Kittitas County, Washington.	W. F. Hille- brand.	G. O. Smith, U. S. G. S. Fol. 106, p. 6, 1904.	Diabase.	In W. T., p. 235.
61	II(III).4''.3.4.	Q 10.32 di 11.33 or 8.34 hy 15.46 ab 23.58 mt 3.71 an 18.35 il 4.71 ap 1.01	Teanaway River, Kittitas County, Washington.	W. F. Hille- brand.	G. O. Smith, U. S. G. S. Fol. 106, p. 6, 1904.	Basalt.	In W. T., p. 311.
62	(I)II.4.(2)3.4.	Q 18.12 di 1.64 or 12.23 hy 8.42 ab 36.15 mt 2.32 an 15.57 il 1.52 ap 0.67	Naches Valley, Snoqualmie quadrangle, Washington.	G. Steiger.	Smith and Calkins, U. S. G. S. Fol. 139, p. 8, 1906.	Andesite.	
63	''II.4''.3''.4.	Q 14.88 di 2.48 or 8.34 hy 9.50 ab 31.44 mt 3.02 an 27.80 il 1.37	Gold Creek, Snoqualmie quadrangle, Washington.	G. Steiger.	Smith and Calkins, U. S. G. S. Fol. 139, p. 9, 1906.	Granodiorite.	
64	''II.4''.3.4.	Q 15.48 di 3.30 or 10.01 hy 8.12 ab 34.58 mt 3.48 an 23.07 il 1.22 ap 0.34	Palisades, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 94, 1902.	Andesite.	In W. T., p. 235.
65	''II.4''.3.4''.	Q 13.68 di 2.00 or 8.34 hy 9.37 ab 36.16 mt 2.55 an 25.02 il 1.37 ap 0.34	The Watchman, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 94, 1902.	Andesite.	In W. T., p. 235.
66	II.4(5).3.4''.	Q 11.70 di 2.69 or 7.78 hy 11.33 ab 35.63 mt 3.02 an 25.85 il 1.22 ap 0.67	Crater rim, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 94, 1902.	Andesite.	In W. T., p. 235.
67	''II.4(5).3.4''.	Q 10.74 di 2.51 or 7.78 hy 11.59 ab 36.16 mt 2.55 an 27.24 il 0.76 ap 0.34	Wizard Island, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 94, 1902.	Andesite.	In W. T., p. 235.
68	II.4''.3''.4''.	Q 12.30 di 2.87 or 7.23 hy 10.28 ab 31.96 mt 3.94 an 28.08 il 1.37 ap 0.67	Llao Rock, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 94, 1902.	Andesite.	In W. T., p. 235
69	II.4(5).3''.4.	Q 10.92 di 3.40 or 7.78 hy 12.06 ab 31.44 mt 2.32 an 29.47 il 1.52 ap 0.34	Desert Cove, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 161, 1902.	Andesite.	Not in W. T.
70	II.4''.3.4''.	Q 11.52 di 2.04 or 6.67 hy 19.92 ab 31.44 mt 1.62 an 23.91 il 1.22 ap 0.34	Cherry Creek, John Day Basin, Oregon.	F. C. Calkins.	F. C. Calkins, Un. Cal., Dep. G., B. III, p. 136, 1902.	Quartz basalt.	
71	II.4(5).3.4''.	Q 12.42 di 3.67 or 7.78 hy 7.23 ab 33.01 mt 6.26 an 25.58 il 2.13 ap 0.67	Halds Canyon, John Day Basin, Oregon.	F. C. Calkins.	F. C. Calkins, Un. Cal., Dep. G., B. III, p. 127, 1902.	Andesite.	
72	(I)II.4.3''.4''.	Q 17.52 di 1.76 or 6.67 hy 9.85 ab 33.01 mt 3.25 an 27.52	Mount Shasta, California.	W. H. Melville.	J. S. Diller, U. S. G. S. B. 150, p. 228, 1898.	Andesite.	In W. T., p. 235.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
73	62.44	16.39	4.66	1.00	2.65	6.22	3.16	2.25	1.02		0.31	0.05	trace	SO ₃ trace BaO 0.03 SrO trace Li ₂ O trace	100.18	
A2. II	1.041	.160	.029	.014	.066	.110	.051	.024			.004	—	—			
74	61.58	16.96	1.75	2.85	3.67	6.28	3.94	1.28	1.06	0.24	0.49	0.22	trace	BaO 0.03 SrO trace Li ₂ O trace	100.35	
A2. II	1.026	.166	.011	.040	.032	.112	.063	.014			.006	.002	—			
75	60.04	17.43	5.39	0.53	3.51	6.65	4.15	1.24	0.90		0.49	0.04	0.08	SO ₃ trace BaO 0.04 Li ₂ O trace	100.49	
A2. II	1.001	.171	.034	.007	.088	.119	.067	.014			.006	—	.001			
76	61.17	17.74	1.78	3.51	2.76	5.90	3.79	1.71	0.83		0.45	0.14	0.12	Cr ₂ O ₃ none BaO 0.06 SrO 0.04 Li ₂ O trace	100.00	
A1. I	1.020	.174	.011	.049	.069	.105	.061	.018			.006	.001	.002			
77	60.93	18.56	2.68	2.19	2.37	6.63	3.79	1.33	0.90		0.61	0.18	0.10	BaO 0.02 SrO 0.12 Li ₂ O none	100.41	
A1. I	1.016	.182	.017	.030	.059	.118	.061	.014			.008	.001	.001			
78	59.84	16.81	1.88	3.60	3.85	6.30	3.63	2.13	1.04		0.57	0.19	0.14	Cr ₂ O ₃ trace BaO 0.07 SrO 0.02 Li ₂ O trace	100.07	
A1. I	.998	.165	.012	.050	.096	.112	.058	.022			.007	.001	.002			
79	62.62	17.51	0.49	4.06	2.84	5.49	3.49	1.76	0.92	0.22	0.55	0.12	0.05	BaO trace SrO trace Li ₂ O trace	100.12	
A2. II	1.044	.172	.003	.057	.071	.098	.056	.019			.007	.001	—			
80	58.09	17.46	1.12	5.08	4.06	6.24	2.94	2.02	1.45	0.29	0.95	0.17	none	CO ₂ 0.21 SO ₃ 0.05 Cl 0.02 F trace BaO 0.07 SrO 0.04 Li ₂ O none Org 0.11		
A1. I	.968	.171	.007	.071	.102	.111	.047	.022			.012	.001				
81	60.20	17.21	3.12	2.69	3.18	6.04	3.35	1.44	1.10	1.12	0.57	0.17	0.12	BaO 0.11 SrO trace Li ₂ O trace	100.50	
A2. II	1.003	.169	.020	.038	.080	.108	.054	.015			.007	.001	.002			
82	59.68	17.09	2.85	2.75	3.54	6.62	3.87	1.31	1.00	0.15	0.65	0.25	trace	CO ₂ 0.20 SO ₃ trace Cl 0.03 BaO 0.04 SrO trace Li ₂ O trace	100.03	
A1. I	.995	.167	.018	.039	.089	.118	.063	.014			.008	.002	—			
83	58.47	18.80	3.34	2.64	2.69	6.60	3.58	2.01	0.92	0.14	0.51	0.22	0.13	BaO 0.09 SrO 0.05 Li ₂ O trace	100.19	
A1. I	.975	.184	.020	.037	.067	.118	.058	.021			.006	.002	.002			
84	63.47	16.75	2.15	2.75	3.04	5.72	3.94	1.62	0.55		0.37	0.13	0.09	BaO 0.04 SrO 0.04 Li ₂ O trace	100.66	
A1. I	1.058	.164	.014	.039	.076	.102	.063	.017			.005	.001	.001			
85	58.08	18.37	2.92	3.38	3.35	7.05	3.66	1.33	1.09		0.44	0.16	0.13	BaO 0.03 SrO 0.02 Li ₂ O trace	100.01	
A1. I	.968	.180	.018	.048	.084	.126	.059	.014			.006	.001	.002			
86	60.02	16.07	2.17	3.46	4.57	7.01	3.55	1.59	0.45	0.24	0.42	0.17	0.10	SO ₃ 0.06 Cr ₂ O ₃ trace BaO 0.08 SrO trace Li ₂ O trace	99.96	
A1. I	1.000	.157	.014	.049	.114	.125	.057	.018			.005	.001	.001			
87	59.34	17.61	3.63	2.28	3.50	6.45	3.40	1.94	0.74	0.64	0.32	0.25	0.12	BaO 0.11 SrO 0.04 Li ₂ O trace	100.37	
A1. I	.989	.172	.022	.032	.088	.115	.055	.020			.004	.002	.002			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
73	"II.4.3."4.	Q 19.80 di 5.40 or 13.34 hy 4.10 ab 26.72 mt 2.32 an 23.63 il 0.61 hm 3.04	Burney Butte, Shasta County, California.	R. B. Riggs.	J. S. Diller, U. S. G. S. B. 148, p. 195, 1897.	Andesite.	In W. T., p. 237.
74	II.4.3.4".	Q 15.30 di 3.56 or 7.78 hy 10.54 ab 31.01 mt 2.55 an 24.74 il 0.91 ap 0.67	Mount Shasta, California.	H. N. Stokes.	J. S. Diller, U. S. G. S. B. 148, p. 190, 1897.	Andesite.	In W. T., p. 237.
75	"II.4".3.4".	Q 13.08 di 6.26 or 7.78 hy 5.90 ab 35.12 mt 0.46 an 25.02 il 0.91 hm 5.12	Burney Creek, Shasta County, California.	R. B. Riggs.	J. S. Diller, U. S. G. S. B. 148, p. 195, 1897.	Andesite.	In W. T., p. 237.
76	"II.4".3.4.	Q 14.76 di 1.57 or 10.01 hy 10.62 ab 31.96 mt 2.55 an 26.41 il 0.91 ap 0.34	Crater Peak, n. Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 197, 1897.	Andesite.	In W. T., p. 237.
77	(I)II.4.3".4".	Q 16.74 di 1.76 or 7.78 hy 5.86 ab 31.96 mt 3.94 an 29.75 il 1.22 ap 0.34	Tuscan Buttes, Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 195, 1897.	Andesite.	In W. T., p. 237.
78	II.4(5).3.4.	Q 11.76 di 5.59 or 12.23 hy 11.26 ab 30.39 mt 2.78 an 23.35 il 1.06 ap 0.34	Bailey Creek, Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 197, 1897.	Andesite.	In W. T., p. 237.
79	(I)II.4.3.4.	Q 17.16 hy 13.30 or 10.56 mt 0.70 ab 29.34 il 1.06 an 26.41 ap 0.34 C 0.20	Chowchilla River, Mariposa County, California.	W. F. Hille- brand.	H. W. Turner, J. G., III, p. 403, 1895.	Quartz diorite.	Also in U.S.G.S. A. R. 17, I, p. 691, 1896. In W. T., p. 239.
80	II.4(5).3(4)."4.	Q 11.40 di 1.36 or 12.23 hy 16.40 ab 24.63 mt 1.62 an 28.86 il 1.82 ap 0.34	Yaqui Creek, Mariposa County, California.	G. Steiger.	H. W. Turner, U. S. G. S. B. 150, p. 342, 1898.	Quartz diorite.	Also in J. G., VII, p. 150, 1899. In W. T., p. 239.
81	"II.4.3".4.	Q 17.46 di 1.11 or 8.34 hy 9.18 ab 28.30 mt 4.64 an 27.80 il 1.06 ap 0.34	Near Pilot Peak, Plumas County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 490, 1894.	Andesite.	In W. T., p. 237.
82	II.4".3.4.	Q 13.80 di 4.64 or 7.78 hy 8.12 ab 33.01 mt 4.18 an 25.02 il 1.22 ap 0.67	Spanish Peak, Plumas County, California.	H. N. Stokes.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 724, 1896.	Quartz diorite.	In W. T., p. 237.
83	(I)II.4(5).3".4.	Q 12.80 di 1.33 or 11.68 hy 7.78 ab 30.39 mt 4.64 an 29.19 il 0.91 ap 0.67	Mount Ingalls, Plumas County, California.	W. F. Hille- brand.	H. W. Turner, J. G., III, p. 407, 1895.	Andesite.	Also in U.S.G.S. A. R. 17, I, p. 731, 1896. In W. T., p. 237.
84	"II.4.3.4.	Q 17.88 di 3.34 or 9.45 hy 8.78 ab 33.01 mt 3.25 an 23.35 il 0.76 ap 0.34	Near Suppans Mountain, Tehama County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 196, 1897.	Andesite.	In W. T., p. 237.
85	II.4(5).3".4.	Q 11.40 di 3.62 or 7.78 hy 10.07 ab 30.92 mt 4.18 an 29.75 il 0.91 ap 0.34	Suppans Mountain, Tehama County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 196, 1897.	Andesite.	In W. T., p. 237.
86	II.4".3.4.	Q 12.06 di 8.93 or 10.01 hy 11.20 ab 29.87 mt 3.25 an 22.80 il 0.76 ap 0.34	Downieville, Sierra County, California.	H. N. Stokes.	H. W. Turner, J. G., III, p. 407, 1895.	Andesite (quartz- bearing).	Also in U.S.G.S. A. R. 17, I, p. 731, 1896. In W. T., p. 237.
87	II."4.3".4.	Q 14.28 di 2.41 or 11.12 hy 8.72 ab 28.82 mt 5.10 an 26.97 il 0.61 ap 0.67	Poker Flat, Sierra County, California.	W. F. Hille- brand.	H. W. Turner, J. G., III, p. 407, 1895.	Andesite.	Also in U.S.G.S. A. R. 17, I, p. 731, 1896. In W. T., p. 237.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
88	65.54	16.52	1.40	2.49	2.52	4.88	4.09	1.95	0.59	0.12	0.39	0.18	0.06	BaO trace SrO trace Li ₂ O trace	100.73	
A2. II	1.092	.162	.009	.035	.063	.087	.066	.021			.005	.001	.001			
89	59.48	17.25	2.15	4.06	2.67	6.50	3.53	2.27	0.71	0.09	0.93	0.33	0.11	BaO 0.09 SrO trace Li ₂ O trace	100.17	
A2. II	.991	.169	.014	.057	.067	.116	.057	.024			.012	.002	.002			
90	63.43	14.20	1.54	4.56	2.35	5.51	3.49	2.19	1.50	0.15	0.73	0.11	0.03	BaO 0.06 SrO trace Li ₂ O none	99.85	
A2. II	1.057	.139	.010	.063	.059	.099	.056	.023			.009	.001	—			
91	63.39	16.58	1.41	3.08	2.15	4.76	3.47	2.79	1.87	0.22	0.44	0.14	trace	BaO 0.11	100.41	
A2. II	1.057	.162	.009	.043	.054	.085	.056	.030			.006	.001	—			
92	62.09	16.69	1.45	3.76	1.93	6.08	3.36	1.84	1.47	0.19	0.32	0.39	trace	SO ₂ 0.10 BaO 0.10	99.77	
A2. II	1.035	.163	.009	.052	.048	.109	.054	.020			.004	.003	—			
93	58.05	15.46	1.69	5.09	4.84	6.94	2.86	2.14	2.02	0.10	0.72	0.16	0.14	CO ₂ none S none NiO none BaO 0.07 SrO trace Li ₂ O trace	100.28	
A1. I	.968	.152	.011	.071	.121	.124	.047	.022			.009	.001	.002			
94	57.41	17.71	2.16	5.01	3.38	6.73	3.12	1.82	1.14	0.20	1.04	0.24	0.15	CO ₂ none S none NiO 0.02 BaO 0.09 SrO 0.04 Li ₂ O trace	100.26	
A1. I	.964	.173	.014	.070	.085	.120	.050	.020			.013	.002	.002			
95	61.05	18.30	3.49	1.11	2.59	7.75	4.06	1.36	0.71		0.09	trace	trace		100.51	2.668
A3. III	1.018	.179	.022	.015	.065	.138	.065	.015			.001	—	—			
96	63.13	16.00	4.34	1.52	2.07	4.45	3.87	2.65	2.00						99.54	
A3. III	1.051	.157	.027	.021	.052	.079	.063	.029								
97	60.41	16.59	3.18	1.70	2.13	5.26	3.94	1.70	2.64	1.94	0.62	0.31	0.07		100.49	
A2. II	1.007	.163	.020	.024	.053	.094	.064	.018			.008	.002	.001			
98	59.95	15.77	3.34	2.34	2.73	5.84	3.07	2.52	2.00	0.95	0.82	0.26	0.09	CO ₂ none ZrO ₂ 0.02 F none BaO 0.11 SrO 0.13	99.94	
A1. I	.999	.154	.021	.032	.068	.104	.050	.027			.010	.002	.001			
99	58.06	17.43	3.83	1.91	2.60	6.33	3.34	2.61	1.88	0.97	0.87	0.27	0.09	CO ₂ none	100.19	
A2. II	.968	.171	.024	.026	.065	.113	.054	.028			.011	.002	.001			
100	60.25	17.90	3.08	2.44	2.44	5.57	4.29	1.89	1.24	0.20	0.65	0.25	0.06	CO ₂ none SrO 0.07	100.33	
A2. II	1.004	.175	.019	.034	.061	.100	.069	.020			.008	.002	.001			
101	62.89	16.42	2.64	2.24	2.50	4.77	4.07	2.15	1.00	0.55	0.83	0.20	0.08	Cr ₂ O ₃ 0.01 BaO 0.07 SrO 0.03 Li ₂ O trace	100.45	
A1. I	1.048	.161	.016	.031	.083	.086	.066	.023			.010	.001	.001			
102	62.51	16.62	1.12	3.75	3.30	5.10	4.28	1.86	0.53	0.15	1.02	0.23	0.10	Cr ₂ O ₃ 0.02 BaO 0.14 SrO 0.03 Li ₂ O trace	100.76	
A1. I	1.042	.163	.007	.052	.083	.091	.069	.020			.013	.002	.001			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
88	(I)II.4.3.4.	Q 19.56 di 2.00 or 11.68 hy 8.24 ab 34.58 mt 2.09 an 20.85 il 0.76 ap 0.34	Ophir, Placer County, California.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. A. R. 14, II, p. 255, 1894.	Granodiorite.	In W. T., p. 237.
89	II.4''3.4.	Q 12.48 di 4.76 or 13.34 hy 8.73 ab 29.87 mt 3.25 an 24.46 il 1.82 ap 0.67	Donner Pass, Placer County, California.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. B. 148, p. 212, 1897.	Granodiorite.	In W. T., p. 237.
90	II.4.(2)3.4.	Q 19.44 di 8.29 or 12.79 hy 7.60 ab 29.34 mt 2.32 an 16.68 il 1.37 ap 0.34	Near Bangor, Butte County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 482, 1894.	Granodiorite.	In W. T., p. 237.
91	(I)II.4.3.(3)4.	Q 18.06 di 1.33 or 16.68 hy 8.43 ab 29.54 mt 2.09 an 21.13 il 0.91 ap 0.34	Grass Valley, Nevada County, California.	H. N. Stokes.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 75, 1896.	Quartz porphyrite.	In W. T., p. 237.
92	(I)II.4.3.4.	Q 18.06 di 2.29 or 11.12 hy 8.82 ab 28.30 mt 2.09 an 24.74 il 0.61 ap 1.01	Nevada City, Nevada County, California.	H. N. Stokes.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 59, 1896.	Porphyrite.	In W. T., p. 237.
93	II.4(5)3.''4.	Q 10.26 di 8.59 or 12.23 hy 14.91 ab 24.63 mt 2.55 an 23.07 il 1.37 ap 0.34	Sonora, Tuolumne County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 731, 1896.	Diorite.	In W. T., p. 239.
94	II.4(5)3.''4.	Q 11.28 di 2.29 or 11.12 hy 13.31 ab 26.20 mt 3.25 an 28.63 il 1.98 ap 0.67	Tuolumne River, Amador County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 702, 1896.	Quartz diorite gneiss.	In W. T., p. 237.
95	''II.4''3.4.	Q 14.16 di 8.42 or 8.34 hy 2.60 ab 34.06 mt 3.25 an 27.52 il 1.15 ap 1.28	Santa Catalina Island, California.	W. S. T. Smith.	W. S. T. Smith, Pr. Cal. Ac. Sci., (3), Geol., I, No. 1, p. 41, 1897.	Andesite.	In W. T., p. 237.
96	(I)II.4.''3.''4.	Q 18.18 di 3.03 or 16.12 hy 3.80 ab 33.01 mt 4.87 an 18.07 hm 0.96	Cross Spur Quarry, Washoe, Nevada.	R. W. Wood- ward.	G. F. Becker, U. S. G. S. Mon. 3, p. 152, 1882.	Andesite.	Also in U. S. G. S. B. 17, p. 33, 1885. In W. T., p. 239.
97	(I)II.4.3.4.	Q 17.64 di 1.73 or 10.01 hy 4.70 ab 33.54 mt 3.71 an 22.52 il 1.22 hm 0.64 ap 0.67	Vindicator Mountain, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 50, 1909.	Andesite.	
98	''II.4.3.(3)4.	Q 17.58 di 4.32 or 15.01 hy 5.06 ab 26.20 mt 4.87 an 21.41 il 1.52 ap 0.67	Columbia Moun- tain, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 56, 1909.	Dacite.	Also in Ec. G., II, p. 680, 1907.
99	''II.4''3.''4.	Q 12.90 di 3.67 or 15.57 hy 4.90 ab 28.30 mt 3.45 an 24.74 il 1.67 hm 1.44 ap 0.67	Black Butte, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 50, 1909.	Andesite.	
100	(I)II.4''3.4.	Q 13.32 di 1.54 or 11.12 hy 6.42 ab 36.15 mt 4.41 an 23.91 il 1.22 ap 0.67	Masons Butte, Walker River Valley, Nevada.	H. N. Stokes.	J. E. Spurr, J. G., IX, p. 593, 1901.	Quartz diorite.	
101	(I)II.4.3.4.	Q 17.46 di 2.41 or 12.79 hy 5.86 ab 34.58 mt 3.71 an 20.02 il 1.52 ap 0.34	Chapultepec, Mexico City, Mexico.	F. N. Guild.	F. N. Guild, A. J. S., XXII, p. 167, 1906.	Andesite.	
102	''II.4''3.4.	Q 14.04 di 2.26 or 11.12 hy 11.56 ab 36.15 mt 1.62 an 20.57 il 1.98 ap 0.67	Malacate, Popocatepetl, Mexico.	F. N. Guild.	F. N. Guild, A. J. S., XXII, p. 164, 1906.	Andesite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
103	60.91	18.08	2.40	3.85	3.54	5.56	4.16	1.01	0.71		0.33	trace			100.55	2.641
A3. III	1.015	.177	.015	.054	.089	.099	.067	.011			.004	—				
104	59.61	16.68	2.66	3.56	2.10	5.58	3.51	2.95	1.31	0.50	0.73	0.18	0.14	CO ₂ 0.14	99.65	
A2. II	.994	.164	.017	.050	.053	.100	.056	.032			.009	.001	.002			
105	59.13	16.97	2.18	4.31	2.38	7.69	3.36	2.57	0.76	0.23	0.68	0.19	0.12	CO ₂ trace	100.57	
A2. II	.986	.166	.014	.060	.060	.138	.054	.028			.009	.001	.002			
106	64.95	18.60	2.00	3.96	2.52	4.67	2.81	0.94	0.12		0.33				100.90	
A3. III	1.083	.182	.013	.055	.063	.084	.045	.010			.004					
107	64.25	19.30	1.70	3.64	2.06	4.20	2.71	1.42	0.37		0.32	0.12			100.09	
A2. II	1.071	.189	.011	.050	.052	.075	.044	.015			.004	.001				
108	63.23	16.73	2.58	3.12	1.84	6.01	3.71	1.11	0.48	0.17	0.40	0.15	0.18	CO ₂ none Cl none S trace NiO none BaO 0.03 SrO none Li ₂ O trace	99.74	
A1. I	1.054	.164	.016	.043	.046	.107	.060	.012			.005	.001	.003			
109	63.10	18.05	2.37	3.95	2.48	5.96	3.35	1.16	0.25		0.21	0.12			101.00	
A2. II	1.052	.177	.015	.055	.062	.106	.054	.013			.003	.001				
110	62.75	17.90	2.38	3.74	2.56	5.56	3.40	1.20	0.12		0.32	0.11			100.12	
A2. II	1.046	.175	.015	.052	.064	.099	.055	.013			.004	.001				
111	62.72	18.30	1.41	3.65	1.97	6.11	3.12	1.46	1.00		0.42	0.17			100.33	
A2. II	1.045	.179	.009	.051	.049	.109	.050	.016			.005	.001				
112	62.45	18.05	2.02	4.00	2.58	5.81	3.27	1.16	0.43		0.19	0.10			100.06	
A2. II	1.041	.177	.013	.056	.065	.104	.053	.012			.002	.001				
113	61.95	18.59	1.43	4.41	2.61	5.23	3.47	0.90	0.89		0.19	0.12			99.79	
A2. II	1.033	.182	.009	.061	.065	.093	.056	.010			.002	.001				
114	61.61	17.95	3.35	3.38	2.09	4.91	3.22	1.04	1.50		0.37	0.19			99.71	
A2. II	1.027	.176	.021	.047	.052	.088	.052	.011			.005	.001				
115	61.40	19.70	1.35	4.19	2.27	4.80	2.80	1.17	2.50		0.33	0.09			100.60	
A2. II	1.023	.193	.009	.058	.057	.086	.045				.004	.001			(100.56)	
116	61.25	17.35	3.42	3.33	2.86	4.67	2.80	1.71	1.50		0.47				99.36	
B2. III	1.021	.170	.021	.046	.072	.084	.045	.018			.006					
117	61.07	17.55	2.13	4.13	2.26	6.28	3.50	0.98	1.37	0.23	0.47	0.15	0.21	CO ₂ none Cl none S 0.02 NiO none BaO 0.02 SrO none Li ₂ O trace	100.34	
A1. I	1.013	.172	.013	.057	.057	.113	.056	.010			.006	.001	.003			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
103	"II. 4'' 3.4(5).	Q 13.56 hy 13.52 or 6.12 mt 3.43 ab 35.11 il 0.61 an 27.52	Iztaccihuatl, Mexico.	A. Röhrig.	H. Lenk in Felix and Lenk, Btr. G. Mex., II, p. 233, 1899.	Andesite.	In W. T., p. 239.
104	"II. 4'' 3.(3)4.	Q 12.90 di 4.76 or 17.79 hy 6.28 ab 29.34 mt 3.94 an 21.13 il 1.37 ap 0.34	Boquete, Panama.	W. C. Wheeler.	D. F. McDonald, U. S. G. S. rec. lab.	Diorite.	
105	II.4(5).3.4''.	Q 10.56 di 11.69 or 15.57 hy 5.38 ab 28.30 mt 3.25 an 23.35 il 1.37 ap 0.34	Boquete, Panama.	W. C. Wheeler.	D. F. McDonald, U. S. G. S. rec. lab.	Diorite.	
106	(I)II.(3)4.3(4). 4''.	Q 29.04 hy 11.32 or 5.56 mt 3.02 ab 23.58 il 0.61 an 23.35 C 4.39	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 550, 1904.	Micronorite.	Inclusion in andesite.
107	(I)II.(3)4.3.4.	Q 29.16 hy 9.82 or 8.34 mt 2.55 ab 23.06 il 0.61 an 20.02 ap 0.34 C 5.92	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 550, 1904.	Cordierite microno- rite.	Inclusion in andesite.
108	(I)II.4.3.4''.	Q 21.30 di 2.72 or 6.12 hy 6.57 ab 31.44 mt 3.71 an 25.58 il 0.76 ap 0.34	Mont Pelée, Martinique, West Indies.	W. F. Hille- brand.	J. S. Diller, Nat. Geog. Mag., XIII, p. 291, 1902.	Volcanic dust (andesite).	Eruption of May 20, 1902.
109	(I)II.4.(3)4.4.	Q 20.70 hy 11.08 or 7.23 mt 3.48 ab 28.30 il 0.46 an 28.63 ap 0.34 C 0.71	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 527, 1904.	Andesite.	Bomb of Aug. 30, 1902.
110	(I)II.4.3'' 4.	Q 20.94 hy 10.76 or 7.23 mt 3.48 ab 28.82 il 0.61 an 26.69 ap 0.34 C 1.12	Eruption of Aug. 30, 1902, Mont Pelée, Martinique.	Pisani.	A. Lacroix, Mont Pelée, p. 531, 1904.	Andesite ash.	Collected on Dominica.
111	(I)II.4.3(4).4.	Q 21.06 hy 9.78 or 8.90 mt 2.09 ab 26.20 il 0.76 an 29.47 ap 0.34 C 0.71	Anse Thurin, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesite.	
112	(I)II.4.3(4).4.	Q 20.58 hy 11.91 or 6.67 mt 3.02 ab 27.77 il 0.46 an 28.08 ap 0.34 C 1.12	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 527, 1904.	Andesite.	Pumice of July 9, 1902.
113	"II.4.3'' 4(5).	Q 20.52 hy 13.10 or 5.56 mt 2.09 ab 29.34 il 0.30 an 25.02 ap 0.34 C 2.65	Eruption of Aug. 30, 1902, Mont Pelée, Martinique.	Pisani.	A. Lacroix, Mont Pelée, p. 531, 1904.	Andesite ash.	
114	(I)II.4.3'' 4''.	Q 24.36 hy 7.97 or 6.12 mt 4.87 ab 27.25 il 0.76 an 23.63 ap 0.34 C 2.86	Piton Pierreux, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesite (quartz- ose).	
115	(I)II."4.3'' 4.	Q 24.42 hy 11.64 or 7.23 mt 2.09 ab 23.58 il 0.61 an 23.07 ap 0.34 C 5.30	Font Saint-Denis, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Dacite.	
116	"II.4.3'' 4.	Q 23.04 hy 9.71 or 10.01 mt 4.37 ab 23.58 il 0.91 an 23.35 C 2.35	Morne de Macouba, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesite.	
117	"II.4.3(4).4(5).	Q 18.48 di 0.92 or 5.56 hy 10.65 ab 29.34 mt 3.02 an 29.47 il 0.91 ap 0.34	Mont Pelée, Martinique, West Indies.	W. F. Hille- brand.	J. S. Diller, Nat. Geog. Mag., XIII, p. 291, 1902.	Andesite pumice.	Eruption of May 8, 1902.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
118	59.97	18.13	2.28	3.95	2.44	6.62	4.11	1.09	0.48		0.72	0.21	trace	NiO trace	100.00	
A2. II	1.000	.178	.014	.055	.061	.118	.066	.012			.009	.009	—			
119	59.40	18.51	0.77	4.59	2.45	6.87	3.77	0.86	2.12		0.39				99.73	
A3. III	.990	.181	.005	.064	.061	.123	.061	.009			.005					
120	60.15	18.31	2.75	3.33	2.88	5.75	3.11	1.61	2.00		0.39				100.32	
A3. III	1.003	.180	.017	.046	.072	.103	.050	.017			.005					
121	63.50	15.80	1.91	3.22	2.32	5.31	3.07	1.54	2.37		0.38	0.05			99.47	
A2. II	1.058	.155	.012	.044	.058	.095	.050	.016			.005	—				
122	62.74	13.67	3.39	4.35	1.74	6.01	4.25	1.23	2.02		trace	0.18	0.42	CO ₂ S none trace	100.00	
A2. II	1.046	.134	.021	.061	.044	.107	.069	.013			—	.001	.006			
123	61.12	17.73	2.52	3.10	2.39	5.45	3.01	2.09	2.54						99.95	2.582
A3. III	1.019	.173	.015	.043	.060	.097	.048	.022								
124	61.35	15.39	4.41	3.40	3.32	6.60	3.87	0.95	0.58						99.87	2.860
A3. III	1.023	.151	.028	.047	.083	.118	.063	.010								
125	59.24	18.16	3.26	3.56	2.84	6.31	4.00	1.31	0.87						99.55	2.801
A3. III	.987	.178	.020	.050	.071	.113	.065	.014								
126	61.38	15.24	3.31	3.43	2.61	4.79	3.29	2.05	2.38		0.50	0.70	0.10	CO ₂ 0.02 ZrO ₂ trace Cl 0.04 S none NiO none BaO 0.12 CuO trace	99.96	
A1. I	1.023	.149	.021	.047	.065	.086	.053	.022			.006	.005	.001			
127	61.12	16.23	1.76	3.68	7.05	4.83	3.01	0.97	0.41		0.48	0.08	trace		99.73	
A2. II	1.019	.159	.011	.061	.176	.086	.048	.010			.006	—	—			
128	59.89	15.85	5.21	3.82	4.15	5.98	2.77	1.34	0.74		0.48	trace	0.12	CO ₂ 0.02 ZrO ₂ none Cl 0.06 S none NiO none BaO 0.03 Cu 0.07 Pb none	100.53	
A1. I	.998	.155	.032	.053	.104	.107	.045	.014			.006	—	.002			
129	63.56	15.43	3.02	2.43	2.55	4.33	4.02	2.41	1.09		0.95	0.17		SO ₃ 0.05	100.01	
A2. II	1.059	.151	.019	.033	.064	.077	.064	.025			.012	.001				
130	63.36	16.35	2.12	3.05	3.28	4.79	3.58	2.92	0.99			0.13			100.57	
A3. III	1.056	.160	.013	.043	.082	.086	.058	.031				.001				
131	61.09	15.96	4.29	2.03	1.06	6.66	2.89	2.51	1.44		0.95	0.22			99.10	2.655
B2. III	10.18	.156	.027	.028	.027	.119	.047	.027			.012	.002				
132	61.04	15.72	5.03	2.15	3.61	5.34	4.02	2.66	0.58		0.45				100.60	
A3. III	1.017	.154	.031	.030	.090	.095	.064	.029			.006					

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
118	"II.4".3".4".	Q 12.84 di 3.40 or 6.67 hy 8.66 ab 34.58 mt 3.25 an 27.80 il 1.37 ap 0.34	Eruption of May, 1902, Mont Pelée, Martinique.	W. Pollard.	J. J. H. Teall, Nature, June 5, 1902, p. 130.	Andesite pumice.	Fell at Barbados.
119	"II.4".3(4).4(5).	Q 12.66 di 2.81 or 5.00 hy 11.87 ab 31.96 mt 1.16 an 30.56 il 0.76	Eruption of May 2-3, 1902, Mont Pelée, Martinique.	Pisani.	A. Lacroix, Mont Pelée, p. 531, 1904.	Andesite ash.	
120	(I)II.4.3(4).4.	Q 17.94 hy 10.37 or 9.45 mt 3.94 ab 26.20 il 0.76 an 28.63 C 1.02	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesite.	"Old pumice."
121	(I)II.4.3".4.	Q 23.58 di 1.36 or 8.90 hy 8.70 ab 26.20 mt 2.78 an 24.74 il 0.76	Rivière Madame, Guadeloupe, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 588, 1904.	Perlite.	
122	II.4.(2)3.4".	Q 18.36 di 11.63 or 7.23 hy 4.64 ab 36.16 mt 4.37 an 15.01 ap 0.34	Island of Grenada, West Indies.	J. B. Harrison.	J. B. Harrison. Rocks of Grenada, p. 10, 1896.	Andesite.	In W. T., p. 239.
123	(I)II.4.3".4.	Q 19.02 hy 9.70 or 12.23 mt 3.48 ab 25.15 an 26.97 C 0.61	Old Providence Island, Caribbean Sea.	J. J. H. Teall.	T. G. Bonney, Min. Mag., VI, p. 42, 1886.	Andesite.	In W. T., p. 239.
124	II.4.3.4(5).	Q 17.22 di 8.86 or 5.56 hy 6.58 ab 33.01 mt 6.50 an 21.68	Beef Island, West Indies.	P. T. Cleve.	P. T. Cleve, Sver. Vet. Ak. Hand., IX, No. 12, p. 35, 1871.	Quartz diorite.	Cf. Hogbom. B. G. Inst. Ups., VI, p. 230, 1905. Not in W. T.
125	"II.4(5).3.4.	Q 12.00 di 3.16 or 7.78 hy 9.93 ab 34.96 mt 4.64 an 27.52	Marys Point, St. John Island, West Indies.	P. T. Cleve.	P. T. Cleve, Sver. Vet. Ak. Hand., IX, No. 12, p. 36, 1871.	Quartz diorite.	Cf. Hogbom. B. G. Inst. Ups., VI, p. 230, 1905. Not in W. T.
126	"II.4.3.4.	Q 20.94 hy 8.94 or 12.23 mt 4.87 ab 27.77 il 0.91 an 19.18 ap 1.68 C 0.51	Cuyuni River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Guiana, p. 40, 1908.	Diorite gneiss.	
127	II.4.3(4).4".	Q 17.34 hy 22.09 or 5.56 mt 2.55 ab 25.15 il 0.91 an 23.91 C 1.53	Northwestern District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Guiana, p. 77, 1908.	Quartz diorite.	
128	II.4.3(4).4.	Q 19.32 di 2.44 or 7.78 hy 11.22 ab 23.58 mt 7.42 an 26.69 il 0.91	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Guiana, p. 61, 1908.	Porphyrite.	In W. T., p. 239.
129	(I)II.4."3.4.	Q 19.38 di 2.59 or 13.90 hy 5.46 ab 33.54 mt 4.41 an 17.24 il 1.52 ap 0.34	Tajumbina, Colombia.	Fernandez.	R. Küch, G. Stud. Colomb., I, p. 125, 1892.	Dacite.	In W. T., p. 239.
130	"II.4".3".4.	Q 15.36 di 2.69 or 17.24 hy 10.86 ab 30.39 mt 3.02 an 19.74 ap 0.34	Cerro Negro de Mayasquer, Colombia.	Fischer.	R. Küch, G. Stud. Colomb., I, p. 186, 1892.	Dacite.	In W. T., p. 239.
131	(I)II.4.3.(3)4.	Q 21.18 di 5.83 or 15.01 wo 0.35 ab 24.63 mt 3.71 an 22.80 il 1.82 hm 1.76 ap 0.67	Loma de Ales, Colombia.	Bragard.	R. Küch, G. Stud. Colomb., I, p. 145, 1892.	Andesite.	In W. T., p. 239.
132	II.4(5).(2)3".4.	Q 12.78 di 7.34 or 16.12 hy 5.60 ab 33.54 mt 5.57 an 16.96 il 0.91 hm 1.12	Penon de Pitayo, Colombia.	Schröder.	R. Küch, G. Stud. Colomb., I, p. 105, 1892.	Andesite.	In W. T., p. 239.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
133	60.05	15.59	6.95	0.65	3.61	6.43	3.83	1.76	0.47		0.85	0.25			100.44	2.728
A2. II	1.001	.152	.044	.010	.090	.114	.061	.019			.010	.002				
134	60.32	16.92	5.88	1.40	3.52	5.64	3.83	2.42	0.44						100.37	
A3. III	1.005	.166	.036	.019	.087	.101	.061	.025								
135	57.91	16.45	6.55	2.32	4.59	3.73	3.59	1.61	1.70		0.37	0.41	0.06	S 0.07	99.36	2.932
B2. III	.985	.161	.041	.032	.115	.066	.058	.017			.005	.003	.001			
136	60.32	17.10	4.74	1.12	2.89	3.51	5.06	2.11	1.99	0.81		0.05	trace		99.70	2.609
A3. III	1.005	.168	.029	.015	.072	.063	.082	.022				—	—			
137	57.82	17.31	4.82	2.20	2.40	6.87	3.69	1.85	2.02			0.34	0.17	CO ₂ S 0.31 0.11	99.91	2.679
A2. II	.964	.170	.030	.030	.060	.123	.060	.020				.002	.002			
138	56.09	16.04	8.81	0.90	3.21	6.09	3.68	1.79	0.49	0.43	1.67	0.29	none	CO ₂ S none none	99.49	
A2. II	.935	.157	.055	.013	.080	.109	.060	.019			.021	.002	—			
139	64.13	13.15	1.08	6.31	1.08	3.62	3.64	2.32	2.71	0.36	1.19	0.31	0.27	S NIO BaO none none 0.09	100.26	
A1. I	1.069	.129	.007	.088	.027	.064	.059	.024			.015	.002	.004			
140	61.69	14.43	1.23	5.86	2.81	4.97	3.20	1.72	2.32	0.25	1.00	0.24	0.30	Cl S NIO BaO 0.02 none none 0.04	100.08	
A1. I	1.028	.142	.008	.082	.070	.089	.052	.018			.013	.002	.004			
141	53.78	12.69	3.44	8.94	2.58	6.36	2.74	2.27	2.19	1.19	2.28	0.55	0.53	CO ₂ FeS ₂ NIO BaO 0.08 0.42 none none 0.09	100.13	
A1. I	.895	.124	.022	.124	.065	.114	.044	.024			.029	.004	.008			
142	58.67	14.37	1.64	6.94	4.65	7.39	3.01	1.42	2.02				trace		100.11	
A3. III	.978	.141	.010	.096	.116	.132	.048	.015					—			
143	60.10	14.40	0.87	5.73	5.10	5.85	4.15	1.55	1.70		0.63	0.05			100.13	
A2. II	1.002	.141	.005	.079	.128	.105	.067	.017			.008	—				
144	56.50	15.20	1.60	7.20	5.15	7.28	2.60	1.52	0.95		1.62	0.07			99.69	
A2. II	.942	.149	.010	.100	.129	.130	.042	.016			.020	—				
145	68.06	14.59	2.61	1.64	3.88	3.97	3.10	1.50	0.75			0.31			100.41	
A3. III	1.134	.143	.016	.023	.097	.071	.050	.016				.002				
146	67.32	13.76	4.12	1.44	1.70	4.32	3.10	2.10	0.76		0.49		0.49		99.60	
A2. II	1.122	.135	.026	.020	.043	.077	.050	.023			.006		.007			
147	62.49	15.14	6.85	1.95	1.72	3.53	3.36	2.07	0.63		0.67		0.36	S 0.58	99.35	
B2. III	1.042	.148	.043	.027	.043	.063	.054	.022			.008		.005			
148	62.38	17.66	1.50	3.71	3.27	4.52	3.46	1.58	0.36		0.64	0.43	0.32		99.83	
A2. II	1.040	.173	.009	.051	.082	.080	.056	.017			.008	.003	.005			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
133	II.4.3.4.⊙	Q 15.12 di 7.56 or 10.56 hy 5.50 ab 31.96 il 1.52 an 20.02 hm 6.95 ap 0.67	Azufral de Tuquerres, Colombia.	Bragard.	R. Kùch, G. Stud. Colomb., I, p. 151, 1892.	Andesite.	Iron oxides? In W. T., p. 239.
134	"II.4".3.4.	Q 13.26 di 4.54 or 13.90 hy 6.60 ab 31.96 mt 4.41 an 22.24 hm 2.72	Chimborazo, Ecuador.	A. Schwager.	Schwager and v. Gümbel, Geogn. Jhft., Cassel, VII, p. 74, 1895.	Andesite.	In W. T., p. 239.
135	II.4."3.4.	Q 17.28 hy 11.50 or 9.45 mt 6.50 ab 30.39 il 0.76 an 13.57 hm 2.08 C 3.06 ap 1.01	Don Pablo, Coquimbo, Chile.	F. v. Wolff.	F. v. Wolff, Z. D. G. G., LI, p. 502, 1899.	Porphyrite.	In W. T., p. 239.
136	(I)II.4(5).(2)3.4.	Q 10.98 hy 7.20 or 12.23 mt 3.48 ab 42.97 hm 2.24 an 17.51 C 0.10	Aconcagua, Argentina.	R. W. Gray.	T. G. Bonney, G. Mag., XXXVI, p. 4, 1899.	Andesite.	Also in Fitzgerald, Highest An- des, p. 321, 1899. In W. T., p. 241.
137	"II.4".3.4.	Q 12.96 di 5.65 or 11.12 hy 3.63 ab 31.44 mt 5.96 an 25.02	Cerro Largo, San Luis, Argentina.	H. Stokes.	F. Tannhäuser, N. J. B. B., XXII, p. 599, 1906.	Hornblende andesite.	
138	II.4".3.4.	Q 12.06 di 3.46 or 10.56 hy 6.40 ab 31.44 il 3.02 an 21.68 hm 8.81 tn 1.57 ap 0.67	San Blas, Argentina.	J. G. Fairchild.	Wright and Fenner, Bur. Am. Ethn., B. 52, p. 86, 1912.	Andesite scoria.	Fresh?
139	"II.4".3.4.	Q 21.48 hy 11.94 or 13.34 mt 1.62 ab 30.92 il 2.28 an 15.85 ap 0.67	Beinn an Lochain, Pennygael, Mull, Scotland.	E. G. Radley.	G. S. Grt. Brit., Sum. Prog. (1912), p. 69, 1913.	Glassy rock.	
140	II.4.3.4.⊙	Q 19.26 di 2.32 or 10.01 hy 14.42 ab 27.25 mt 1.98 an 20.02 il 1.98 ap 0.67	Mullach Glach, Pennygael, Mull, Scotland.	E. G. Radley.	G. S. Grt. Brit., Sum. Prog. (1912), p. 69, 1913.	Tholeite.	Glassy portion. Cf. No. 32, II.4.3.3.
141	II".4".3.(3)4.	Q 11.04 di 10.52 or 13.34 hy 11.89 ab 23.06 mt 5.10 an 15.57 il 4.41 ap 1.34	Loch Ba, Gruline, Mull, Scotland.	E. G. Radley.	G. S. Grt. Brit., Sum. Prog. (1912), p. 68, 1913.	Trachyte.	
142	II".4".3.4.	Q 11.28 di 12.40 or 8.34 hy 16.82 ab 25.15 mt 2.32 an 21.68	Eskdale Muir, Dumfries, Scotland.	Wilson.	Cited in J. J. H. Teall, Brit. Petrog., p. 196, 1888.	Andesite (glassy).	
143	II.4(5).(2)3.4	Q 8.52 di 10.88 or 9.45 hy 16.20 ab 35.11 mt 1.16 an 15.85 il 1.22	Mont de Valais, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 128, 1913.	Microdiorite.	
144	II".4(5).3(4).4.	Q 10.44 di 8.87 or 8.90 hy 17.79 ab 22.01 mt 2.32 an 25.30 il 3.04	Les Rondellieres, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 125, 1913.	Biotite diabase.	
145	(I)II.(3)4.3.4.	Q 30.36 hy 10.62 or 8.90 mt 3.71 ab 26.20 ap 0.67 an 17.79 C 1.33	San Eliseo, Corsica.	J. Deprat.	J. Deprat, B. Soc. G. Fr. (4), VI, p. 435, 1906.	Quartz diorite.	
146	(I)II.(3)4.3."4.	Q 30.12 di 3.24 or 12.79 hy 2.80 ab 26.20 mt 4.87 an 17.24 il 0.91 hm 0.80	Fabhemala, Karlskrona, Blekinge, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 268, 1906.	Granite gneiss.	
147	(I)II.4.3.4.	Q 25.02 hy 4.30 or 12.23 mt 5.57 ab 28.30 il 1.22 an 17.51 hm 3.04 C 0.92	Palnotjakko, Lapland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 256, 1906.	Granite.	
148	"II.4.3.4.	Q 21.06 hy 13.35 or 9.45 mt 2.09 ab 24.34 il 1.22 an 19.46 ap 1.01 C 3.06	Ivalojoiki, Lapland, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Finl., No. 15, p. 51, 1905.	Granite gneiss.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
149	63.18	17.03	0.24	6.37	0.92	4.17	4.44	2.91	0.52			0.23		SO ₂ 0.19	100.20	
A3. III	1.053	.167	.002	.089	.023	.075	.072	.031				.032				
150	61.27	15.96	1.88	3.35	5.31	4.33	4.08	2.52	0.74		0.40	0.32			100.16	
A2. II	1.021	.156	.012	.047	.133	.077	.066	.027			.005	.002			(100.15)	
151	57.73	16.05	2.54	5.14	1.93	4.76	4.04	2.58	2.02		1.85	0.52		CO ₂ 0.20 SO ₂ 0.77	100.13	2.723
A2. II	.962	.157	.015	.071	.048	.085	.065	.027			.023	.004				
152	58.06	15.44	2.19	4.24	4.68	6.52	3.13	1.51	2.79		1.11	0.21		CO ₂ 0.32 SO ₂ 0.16 Org. 0.01	100.37	2.659
A2. II	.968	.151	.014	.059	.117	.116	.050	.016			.013	.001				
153	57.38	16.92	5.70	5.84	2.00	3.66	4.03	2.08	0.84		0.83	trace	trace		99.28	
B3. IV	.956	.166	.035	.080	.050	.066	.064	.022			.010	—	—			
154	60.80	17.24	3.95	2.97	2.83	5.34	2.69	0.95	0.90	0.22	1.12	0.78		CO ₂ 0.05 SO ₂ 0.10	99.94	
A2. II	1.013	.169	.025	.042	.071	.095	.044	.010			.011	.005				
155	63.75	15.24	2.21	3.46	1.99	5.04	3.64	2.76	0.71	none	0.51	0.32		FeS ₂ 0.24	99.87	
A2. II	*1.063	.149	.014	.048	.050	.090	.059	.030			.006	.002				
156	59.86	17.12	7.54	0.52	4.02	5.08	3.08	1.72	0.25	0.15	0.22	0.22			99.79	2.75
A2. II	.998	.168	.047	.007	.101	.091	.050	.018			.003	.002				
157	58.09	16.24	3.74	3.07	3.08	5.88	3.35	2.92	1.25	0.25	0.05	1.75		SO ₂ 0.83	100.50	
A2. II	.968	.159	.023	.043	.077	.105	.054	.031			—	.012				
158	55.58	16.58	5.02	2.72	4.56	8.16	3.02	1.66	0.69	0.18	0.18	1.43		SO ₂ 0.33	100.11	
A2. II	.926	.163	.031	.038	.114	.146	.048	.018			.002	.010				
159	58.98	13.07	3.39	4.35	1.79	8.63	3.70	1.61	1.41		1.63	0.53			99.09	
B2. III	.983	.128	.021	.061	.045	.154	.060	.017			.020	.004				
160	60.12	16.82	3.18	3.27	2.73	4.31	4.27	2.70	1.35		0.45	0.27		CO ₂ 0.19 SO ₂ 0.12	99.78	2.746
A2. II	1.002	.165	.020	.016	.068	.078	.069	.029			.006	.002				
161	60.08	13.90	7.16	3.50	2.91	4.04	3.23	2.35	2.61						99.78	2.735
A3. III	1.001	.136	.045	.049	.073	.072	.052	.025								
162	61.44	15.39	1.73	6.80	2.59	4.35	3.43	1.88	1.35		0.41	0.13		SO ₂ 0.19	99.69	2.793
A2. II	1.024	.151	.011	.094	.065	.078	.055	.020			.005	.001			(99.72)	
163	60.72	13.96	2.80	8.28	2.71	4.20	2.63	1.42	1.74		1.80	0.85		S trace	101.11	2.878
B2. III	1.012	.136	.018	.115	.068	.075	.042	.015			.023	.006				
164	67.1	13.6	2.1	1.2	2.1	4.9	3.2	2.6	2.1					CO ₂ 0.5	99.4	
B3. IV	1.118	.133	.013	.017	.058	.068	.052	.028								

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
149	(I)II.4(5).(2)3.4.	Q 11.58 di 0.96 or 17.23 hy 13.29 ab 37.73 mt 0.46 an 17.51 ap 0.67	Zwingenberg, Melibocus Mountains, Baden.	Heurich.	A. Osann, Mt. Bad. G. L.-A., II, p. 385, 1893.	Malchite.	In W. T., p. 241.
150	II.4(5).(2)3.4.	Q 10.02 di 1.54 or 15.01 hy 16.53 ab 34.58 mt 2.78 an 17.51 il 0.76 ap 0.67	Grossachsener Thal, Baden.	M. Dittrich.	M. Dittrich, Mt. Bad. G. L.-A., IV, p. 202, 1901.	Hornblende diorite.	
151	II.4(5)''3.4.	Q 11.40 di 1.61 or 15.01 hy 8.62 ab 34.06 mt 3.48 an 18.07 il 3.50 ap 1.34	Staffelhof, Nahe River, Rhenish Prussia.	K. Gremse.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 309 (1889), 1892.	Porphyrite.	In W. T., p. 241.
152	II.4.3.4.⊙	Q 13.50 di 6.24 or 8.90 hy 12.93 ab 26.20 mt 3.24 an 23.63 il 1.98 ap 0.34	Kronweiler, Saar-Nahe Gebiet, Rhenish Prussia.	Böttchar.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 290 (1889), 1892.	Porphyrite pitchstone.	In W. T., p. 241.
153	II.''4.''3.4.	Q 13.38 hy 9.62 or 12.23 mt 8.12 ab 33.54 il 1.52 an 18.35 C 1.43	Lauterbach, Siebengebirge, Rhenish Prussia.	E. Kaiser.	E. Kaiser, Vh. Nh.Ver. Bonn, LIV, p. 178, 1897.	Andesite.	In W. T., p. 241.
154	''II.(3)4.3''4''.	Q 27.54 hy 7.50 or 5.56 mt 5.80 ab 23.06 il 2.13 an 21.68 ap 1.68 C 3.77	Pulverkeller, Odenwald.	Stadler.	G. Klemm, Nbl. Ver. Erdk. Darm. (4), XXVII, p. 21, 1906.	Granitic "mixed rock."	
155	''II.4.(2)3.''4.	Q 18.48 di 5.23 or 16.68 hy 6.14 ab 30.92 mt 3.25 an 16.68 il 0.91 ap 0.67	Walderlenbach, Hesse.	Surv. lab.	C. Chelius, Erl. G. Kt. Hes., Bl. Lindenber, p. 36, 1901.	Granite.	
156	II.4.3.4.⊙	Q 19.26 hy 10.10 or 10.01 mt 0.93 ab 26.20 il 0.46 an 23.35 hm 6.88 C 1.63 ap 0.67	Galgenberg, Hesse.	Surv. lab.	Chelius and Klemm, Erl. G. Kt. Hes., Bl. Neustadt, p. 8, 1894.	Granite.	In W. T., p. 241.
157	II.4''.''3.(3)4.	Q 13.86 hy 10.34 or 17.24 mt 5.34 ab 28.30 ap 4.03 an 18.07 C 0.92	Weinheim, Hesse.	Surv. lab.	C. Chelius, Erl. G. Kt. Hes., Bl. Lindenfels, p. 34, 1901.	Quartz diorite.	
158	II.4''.''3''4.	Q 12.06 di 3.49 or 10.01 hy 10.43 ab 25.15 mt 7.19 an 26.97 il 0.30 ap 3.36	Felsenmeer, Hesse.	Surv. lab.	C. Chelius, Erl. G. Kt. Hes., Bl. Neunkirchen, p. 16, 1901.	Granite.	P ₂ O ₅ high?
159	II.4.(2)3.4	Q 16.74 di 14.68 or 9.45 wo 1.74 ab 31.44 mt 4.87 an 14.18 il 3.04 ap 1.34	Bergfeld, Westerwald, Germany.	H. Schneider- höhn.	H. Schneiderhöhn, Jb. Pr. G. L.-A., XXX (II), p. 306 (1909), 1910.	Trachyan- desite.	
160	''II.4(5).(2)3.4.	Q 11.28 di 0.89 or 16.12 hy 9.01 ab 36.15 mt 4.64 an 18.63 il 0.91 ap 0.67	Ilmenau, Thüringerwald, Germany.	Eyme.	R. Cronacher, In. Diss. Greifs., p. 49, 1909.	Quartz syenite.	
161	II.4.''3''4.	Q 19.80 di 2.84 or 13.90 hy 6.60 ab 27.25 mt 10.44 an 16.40	Suhl, Thuringia.	J. Fromme.	J. Fromme, Sb. Ph. Med. Soc. Erl., XXV, p. 30, 1893.	Granite.	Not in W. T.
162	II.4.3.4.⊙.	Q 16.86 hy 16.90 or 11.12 mt 2.55 ab 28.82 il 0.76 an 20.85 ap 0.34 C 0.10	Huyseburge Häu, Brocken, Harz.	Eyme.	O. H. Erdmanns- dörfer, Jb. Pr. G. L.-A., XXVII, p. 355, 1906.	Quartz diorite.	Inclusion in granite. Cf. No. 268, I.4.2.3.
163	II.(3)4.3.4.	Q 25.08 hy 16.57 or 8.34 mt 4.18 ab 22.01 il 3.50 an 15.29 ap 2.02 C 2.45	Schmalenberg, Brocken, Harz.	Hampe.	O. H. Erdmanns- dörfer, Jb. Pr. G. L.-A., XXVII, p. 356, 1906.	Quartz diorite.	
164	(I)II.''4.(2)3. (3)4.	Q 26.40 di 7.66 or 15.57 hy 2.23 ab 27.25 mt 3.02 an 14.73	Near Erdmanns- dörf, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J., 1905, II, p. 22.	Quartz porphyry.	Border of dike. Cf. No. 36, I.4.3.3.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
165	61.40	19.98	1.28	4.08	3.67	4.43	2.21	1.33	1.44						99.82	
A3. III	1.023	.196	.008	.057	.092	.078	.035	.014								
166	62.51	14.81	1.68	2.97	3.12	5.04	3.49	2.03	1.52		1.85	0.51	0.64	CO ₂ Li ₂ O 0.36 trace	100.53	
A2. II	1.042	.145	.011	.042	.078	.090	.056	.021			.023	.004	.009		(100.57)	
167	60.23	13.87	2.46	4.15	3.14	7.97	3.21	1.34	0.79		1.80	0.61		S 0.48	100.50	
A2. II	1.004	.136	.015	.058	.079	.143	.052	.014			.023	.004				
168	61.05	15.86	2.95	2.14	1.90	4.09	3.46	3.18	3.95		1.24		0.44		100.26	
A2. II	1.018	.156	.019	.030	.048	.073	.056	.033			.016		.006			
169	56.90	17.34	5.51	5.23	2.25	5.20	4.27	1.26	1.40			0.59	0.08	S 0.21	100.24	
A2. II	.943	.170	.034	.072	.056	.093	.069	.014				.004	.001			
170	60.84	18.75	1.40	3.48	1.95	5.32	2.88	2.13	3.15		0.29				100.19	
A3. III	1.014	.184	.009	.049	.049	.094	.047	.022			.004					
171	64.95	16.11	3.16	2.18	2.04	4.68	4.40	1.53	1.45		0.11	trace			100.61	
A3. III	1.083	.158	.020	.031	.051	.084	.071	.016			.001	—				
172	57.49	17.18	5.45	6.18	3.23	5.35	2.59	1.59	0.35		0.28	0.02	trace		99.71	
A2. II	.958	.168	.034	.086	.081	.096	.042	.017			.004	—	—			
173	59.95	17.35	1.44	5.59	2.88	6.75	3.30	2.08	1.42						100.76	
A3. III	.999	.170	.009	.078	.072	.121	.053	.022								
174	62.24	17.49	1.37	3.36	2.57	3.44	3.59	3.08	1.90	0.18	1.00				100.22	2.78
A3. III	1.037	.171	.009	.047	.064	.082	.058	.033			.013					
175	56.58	15.31	6.95	1.50	4.14	7.20	3.28	2.67	1.49	0.03	1.35				100.20	2.81
A3. III	.943	.150	.044	.021	.104	.129	.053	.029			.017					
176	58.50	15.51	5.13	0.92	5.45	7.32	2.72	2.33	1.16	0.10	0.58				99.72	2.899
A3. III	.975	.152	.032	.013	.136	.130	.044	.024			.007					
177	62.27	16.92	2.40	2.59	2.87	4.78	4.72	1.47	1.22		0.16	trace		Cl 0.07	99.47	2.584
A?3. III?	1.038	.166	.015	.036	.072	.086	.076	.016			.002	—				22°
178	60.63	16.96	2.87	2.31	3.27	6.41	3.58	2.44	1.98						100.45	2.594
A?3. III?	1.011	.166	.018	.032	.082	.114	.058	.026								22°
179	59.29	15.27	5.21	2.08	4.42	6.15	3.31	2.61	1.46			0.18		Cl 0.04	100.02	2.614
A?3. III?	.988	.150	.032	.030	.111	.110	.053	.027				.001				22°
180	63.18	14.64	1.50	5.18	2.26	7.69	2.48	1.57	0.21			1.36	0.41		100.48	
A?2. II?	1.053	.144	.009	.072	.057	.137	.040	.017				.010	.006			

ORDER 4. QUARDOFELIC AUSTRARE—Continued.

SUBBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
165	"II.(3)4.3(4).4.	Q 25.92 hy 15.67 or 7.78 mt 1.86 ab 18.34 an 21.63 C 7.04	Bärenstein, n. Schmiedeberg, Riesengebirge.	Herz.	L. Milch, N. J. B. B., XII, p. 211, 1899.	Monzonite.	In W. T., p. 243.
166	"II.4.3.4.	Q 20.40 di 2.00 or 11.68 hy 9.08 ab 29.34 mt 2.55 an 18.90 il 3.50 ap 1.34	Appmannsberg, Bayrischer Wald, Germany.	A. Schwager.	Oebbeke and Schwager, Geogn. Jhft., XIV, p. 249, 1901.	Granite- diorite.	
167	II.4.3.4.○.	Q 18.54 di 13.34 or 7.78 hy 4.16 ab 27.25 mt 3.48 an 19.46 il 3.50 ap 1.34	Steining, n. Passau, Bayrischer Wald? Germany.	E. Lay.	A. Frentzel, Geogn. Jhft., XXIV, p. 143, 1911.	Diorite.	
168	(I)II.4."3.(3)4.	Q 17.70 di 1.30 or 18.35 hy 4.33 ab 29.34 mt 4.41 an 18.63 il 2.43	Giesshübel, Bohemia.	Z. Weyberg.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Andesite.	
169	II.4(5).3.4".	Q 11.70 hy 10.75 or 7.78 mt 7.89 ab 36.15 ap 1.34 an 22.24 C 0.70	Near Huch, Eisengebirge, Bohemia.	C. v. John.	v. John and Hinterlechner, Jb. G. R.-A., Wien, LIX (1), p. 149, 1909.	Diorite.	
170	(I)II.4.3".4.	Q 19.62 hy 9.65 or 12.23 mt 2.09 ab 24.63 il 0.61 an 26.13 C 2.14	Wolfsgrube, Ursulaberg, Carinthia.	Not stated.	H. v. Foullon, Vh. Wien. G. R.-A., XXIII, p. 93, 1889.	Quartz porphyrite.	In W. T., p. 243.
171	(I)II.4.3.4".	Q 20.70 di 2.87 or 8.90 hy 5.06 ab 37.20 mt 4.64 an 19.74 il 0.15	Romanszaszka, Krasso-Szőreny, Hungary.	K. Emszt.	Rozloznsnik and Emszt, Mt. Ung. G. A., XVI, p. 187, 1908.	Banatite.	
172	II.4.3(4).4.	Q 16.98 hy 14.44 or 9.45 mt 7.89 ab 22.01 il 0.61 an 26.69 C 1.33	Osopt, Krasso-Szőreny, Hungary.	K. Emszt.	Rozloznsnik and Emszt, Mt. Ung. G. A., XVI, p. 189, 1908.	Banatite.	
173	II.4(5).3.4.	Q 11.52 di 6.04 or 12.23 hy 13.29 ab 27.77 mt 2.09 an 26.41	Lienz, Tyrol.	C. v. John.	W. Hammer, Jb. G. R.-A. Wien, LIII, p. 71, 1904.	Andesite.	
174	(I)II.4.(2)3.(3)4.	Q 16.68 hy 9.70 or 18.35 mt 2.09 ab 30.39 il 1.98 an 17.24 C 1.84	Piz Gliovers Dado, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite.	
175	II.4(5).3.(3)4.	Q 9.00 di 13.18 or 16.12 hy 4.30 ab 27.77 mt 0.93 an 18.90 il 2.58 hm 6.40	Piz Tiarus, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Diorite porphyrite.	
176	II.4".3.(3)4.	Q 13.02 di 9.94 or 13.34 hy 9.00 ab 23.06 mt 1.39 an 23.35 il 1.06 hm 4.16	Piz Giuf, Aar Massif, Switzerland.	L. Hezner.	F. Weber, Btr. G. Kt. Schw., XIV, p. 77, 1904.	Spessartite.	
177	(I)II.4".3.4".	Q 14.10 di 2.65 or 8.90 hy 8.44 ab 39.82 mt 3.48 an 20.57 il 0.30	Punta della Civitate, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 142, 1893.	Andesite.	In W. T., p. 243.
178	"II.4".3.4.	Q 12.90 di 7.07 or 14.46 hy 6.69 ab 30.39 mt 4.18 an 22.80	Poppa alla Nave, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 141, 1893.	Andesite.	In W. T., p. 243.
179	II.4".3."4.	Q 13.20 di 7.99 or 15.01 hy 7.40 ab 27.77 mt 6.96 an 19.46 hm 0.32	Monte Patello, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 142, 1893.	Andesite.	In W. T., p. 243.
180	II.4.3(4).4.	Q 23.70 di 3.96 or 9.45 hy 12.69 ab 20.96 mt 2.09 an 24.19 ap 3.34	Lava of 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	In W. T., p. 243.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
181	59.27	14.55	2.02	7.17	3.50	7.76	2.88	1.62	0.36			0.91	0.32		100.36	
A72. II?	.971	.143	.013	.100	.088	.138	.047	.017				.006	.005			
182	61.19	17.80	0.87	4.25	3.71	6.58	2.73	2.43	0.40		0.66				100.62	
A3. III	1.020	.174	.005	.059	.093	.118	.044	.026			.008				(100.83)	
183	56.34	13.95	1.94	6.73	6.41	6.20	3.10	0.76	1.04	0.63	2.22	0.44			99.79	
A2. II	.939	.137	.012	.093	.160	.111	.050	.008			.028	.003				
184	55.16	18.32	2.42	4.15	2.75	7.04	3.23	1.10	3.58		0.74	1.33			99.82	
A2. II	.919	.180	.015	.058	.069	.126	.052	.012			.009	.009				
185	59.94	15.52	2.53	2.00	3.62	6.76	4.46	1.29	3.35						99.47	
B3. IV	.999	.152	.016	.028	.091	.121	.072	.014								
186	63.61	17.64	1.81	2.09	3.19	5.22	4.70	1.28	0.57						100.11	
A3. III	1.060	.173	.011	.030	.080	.093	.076	.014								
187	61.90	17.28	1.70	5.76	2.76	4.68	2.52	1.80	1.30						99.70	
A3. III	1.032	.169	.011	.080	.069	.084	.040	.019								
188	55.87	18.74	4.88	5.01	1.39	8.20	3.43	1.55	0.36		0.01			Cl trace	99.45	2.767
B3. IV	.931	.184	.031	.069	.035	.146	.055	.017			—					
189	55.46	16.76	5.15	3.00	2.44	10.00	2.94	1.95	1.60		0.21				99.51	2.610
A3. III	.918	.164	.032	.042	.061	.179	.047	.022			.003					
190	62.90	18.29	1.79	4.00	1.61	5.62	2.91	1.48	0.90		0.18			Cl trace	99.77	2.464
A3. III	1.048	.179	.012	.056	.040	.100	.047	.016			.002					
191	59.94	18.40	3.69	2.99	1.95	6.58	3.43	1.67	0.94		0.02				99.61	2.440
A3. III	.999	.180	.023	.042	.048	.118	.055	.019			—					
192	59.83	17.82	3.62	4.60	1.64	6.88	3.31	1.23	0.52		0.01				99.44	2.635
B3. IV	.997	.175	.023	.064	.041	.123	.053	.014			—					
193	60.60	18.21	1.93	4.00	2.52	5.95	3.70	2.29	none		0.70	trace			99.90	
A3. III	1.010	.178	.012	.056	.063	.106	.060	.024			.009	—				
194	62.00	17.53	2.33	2.51	2.39	5.95	3.44	2.63	1.02		0.59	trace	trace		100.39	
A3. III	1.033	.172	.014	.035	.060	.106	.055	.028			.007	—	—			
195	61.93	16.45	4.66	0.40	2.94	4.40	4.03	2.20	2.50						99.51	2.539
A3. III	1.032	.161	.029	.006	.074	.079	.065	.023								15°
196	59.50	18.71	2.32	3.96	3.49	5.10	3.82	1.18	0.60		1.68	0.07			100.43	
A2. II	.992	.183	.014	.055	.087	.091	.061	.013			.021	—				
197	64.4	16.1	3.5	1.0	2.7	5.0	4.2	1.6	1.1		0.65		trace		100.25	
B3. IV	1.073	.158	.022	.014	.068	.089	.068	.017			.008	—				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
181	II.4''3.4.	Q 12.60 di 9.06 or 9.45 hy 16.40 ab 24.63 mt 3.02 an 21.96 ap 2.02	Lava of 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	In W. T., p. 243.
182	II.4''3(4).(3)4.	Q 14.34 di 3.19 or 14.46 hy 13.81 ab 23.06 mt 1.16 an 28.91 il 1.22	Esporlatu, Sardinia.	C. Riva.	C. Riva, Atti Ac. Sci. Nap., (2), XII, No. 9, p. 26, 1905.	Diorite.	
183	II(III).4''3''. 4(5).	Q 11.64 di 4.91 or 4.45 hy 21.03 ab 26.20 mt 2.73 an 21.96 il 4.26 ap 1.01	Canale Perdiera, Monte Arci, Sardinia.	H. S. Washing- ton.	H. S. Washington. A. J. S., XXXVI, p. 587, 1913.	Andesite.	
184	II.4.3(4).4.	Q 14.40 hy 11.39 or 6.67 mt 3.48 ab 27.25 il 1.37 an 26.69 ap 3.02 C 2.04	Seddass de Su Murta, San Antioco, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. W., Anh. No. 2, p. 56, 1912.	Andesite.	Also in N. J. Cb., 1912, p. 738.
185	II.4(5)''3.4''.	Q 11.58 di 12.04 or 7.78 hy 5.02 ab 37.73 mt 3.71 an 18.35	Mokraja Wolno- wacha, Mariupol, Russia.	J. Morozewicz.	J. Morozewicz, Ref. N. J., 1900, I, p. 394.	Andesite.	In W. T., p. 243.
186	(I)II.4''3.4''.	Q 14.70 di 2.22 or 7.78 hy 9.41 ab 39.82 mt 2.55 an 23.07	Tschchera River, Caucasus.	L. Lessing and Krikmeyer.	Loewinson-Lessing, Ref. N. J., II, p. 239.	Andesite- dacite.	In W. T., p. 243.
187	II.4.3''4.	Q 22.26 hy 16.14 or 10.56 mt 2.55 ab 20.96 an 23.35 C 2.65	Kasbek, Caucasus.	L.-Lessing and Krikmeyer.	Loewinson-Lessing, Ref., N. J., 1899, II, p. 237.	Andesite- dacite.	In W. T., p. 243.
188	II.4(5).3(4).4.	Q 10.08 di 7.88 or 9.45 hy 4.57 ab 28.82 mt 7.19 an 31.14	Mount Oros, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Andesite.	In W. T., p. 283.
189	II.4(5).3''4.	Q 9.72 di 14.91 or 12.23 wo 1.86 ab 24.63 mt 7.42 an 26.41 il 0.46	Mount Chondos, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Andesite.	In W. T., p. 245.
190	(I)II.4.3(4).4.	Q 23.28 hy 9.54 or 8.90 mt 2.78 ab 24.63 il 0.30 an 27.80 C 1.63	Kosona, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Dacite.	In W. T., p. 191.
191	(I)II.4.3''4.	Q 15.84 di 2.72 or 10.56 hy 5.98 ab 28.82 mt 5.34 an 29.47	Kaimeni, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Andesite.	In W. T., p. 245.
192	''II.4.3(4).4.	Q 16.98 di 3.72 or 7.78 hy 7.66 ab 27.77 mt 5.34 an 29.75	Mount Chelona, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Andesite.	In W. T., p. 245.
193	''II.4(5).3.4.	Q 12.48 di 2.72 or 13.34 hy 9.59 ab 31.44 mt 2.78 an 26.13 il 1.27	Santorini, Greece.	Pisani.	A. Lacroix, C. R., CXL, p. 974, 1905.	Microtinite (andesite).	
194	(I)II.4.3''4.	Q 15.96 di 3.77 or 15.57 hy 6.05 ab 28.82 mt 3.48 an 24.74 il 1.06	Kalymnos Island, Aegean Sea.	F. Millosevich.	F. Millosevich, Rend. Ac. Linc., XXI (2), p. 306, 1912.	Andesite.	
195	(I)II.4.3.4.	Q 16.68 di 1.30 or 12.78 hy 6.80 ab 34.06 mt 1.39 an 20.29 hm 3.50	Pergamon, Asia Minor.	R. Lepsius.	R. Lepsius, Geol. Attika, p. 169, 1893.	Dacite.	In W. T., p. 245.
196	''II.4.3.4.	Q 15.54 hy 11.34 or 7.23 mt 3.25 ab 31.96 il 3.19 an 25.30 C 1.84	Mount Zan, n. Zagoué, Ivory Coast.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 118, 1911.	Hypersthene granite.	
197	(I)II.4.3.4.	Q 19.38 di 5.62 or 9.45 hy 4.20 ab 35.63 mt 1.39 an 20.29 il 1.22 hm 2.56	Gebel Doukhan, Egypt.	Not stated.	J. Couyat, C. R., CXLVII, p. 989, 1908.	Porphyry.	"Porfido rosso."

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
198	64.3	16.4	1.85	2.5	3.0	4.7	4.3	2.0	0.6		0.45				100.1	
B3. IV	1.072	.160	.012	.035	.075	.084	.069	.021			.006					
199	62.07	17.15	1.87	3.57	2.39	4.84	4.75	2.15	0.97	0.21	0.21	trace	0.26	S 0.08	100.52	
A2. II	1.035	.168	.012	.050	.060	.087	.077	.023			.003	—	.004			
200	52.53	14.16	10.03	7.46	2.72	5.43	3.02	1.85	1.74		0.69	0.61	trace		100.24	
A2. II	.876	.139	.063	.104	.068	.096	.048	.020			.009	.004	—			
201	64.10	15.65	6.66	2.38	1.44	4.40	2.57	1.71	0.85						99.76	
A3. III	1.068	.153	.042	.033	.036	.079	.042	.018								
202	58.15	13.11	2.72	6.27	2.87	5.51	3.09	2.73	2.67	0.27	1.84	0.40			99.63	
A2. II	.969	.128	.017	.088	.072	.098	.050	.029			.023	.003			(99.3)	
203	62.20	16.58	5.00	2.80	4.20	4.40	2.10	1.80	n. d.			0.37	trace	FeS ₂ 0.17	99.62	2.686
A3. III	1.037	.163	.031	.039	.105	.079	.034	.019				.003	—			
204	62.10	16.03	2.55	1.95	2.67	6.05	3.12	1.48	1.70	1.07	0.71	0.14	trace	F 0.09	99.66	2.565
A2. II	1.035	.157	.016	.027	.067	.108	.050	.016			.009	.001	—			
205	55.90	17.00	5.29	3.64	3.36	8.08	3.27	1.45	0.66		1.31	0.29	trace	F 0.09	100.34	2.781
A2. II	.932	.167	.033	.050	.084	.145	.053	.016			.016	.002	—			
206	58.31	18.40	3.70	3.29	2.57	5.74	3.98	2.22	2.08					CO ₂ 0.13	100.42	2.72
A3. III	.972	.180	.023	.046	.064	.103	.065	.023								
207	65.32	14.03	3.23	4.65	1.24	5.25	3.46	1.28	1.46						99.92	
A3. III	1.089	.137	.020	.065	.016	.094	.056	.014								
208	63.68	16.18	0.93	4.62	2.25	4.84	3.31	2.59	0.31		0.93	0.38	0.02		100.02	
A2. II	1.061	.159	.006	.064	.056	.087	.053	.028			.012	.003	—			
209	62.38	17.77	0.44	4.53	1.80	5.01	4.09	1.85	0.55	0.30	0.86	0.39	0.08	CO ₂ none ZrO ₂ none SO ₃ trace Cl 0.07 F none S 0.04 NiO 0.05 BaO none	100.21	
A1. I	1.040	.174	.003	.063	.045	.089	.066	.020			.011	.003	.001			
210	62.38	15.86	1.01	4.33	2.22	4.83	3.65	2.49	1.36		0.99	0.29	0.10		99.51	
A2. II	1.040	.156	.006	.060	.056	.086	.059	.027			.012	.002	.001			
211	57.42	18.53	1.55	5.08	4.72	4.90	2.59	2.15	2.59		0.60	trace	0.07		100.20	
A2. II	.957	.182	.010	.071	.118	.088	.042	.023			.008	—	.001			
212	57.13	14.40	6.03	5.45	3.17	6.81	3.04	1.41	1.76		0.80	0.18	0.14		100.32	
A2. II	.952	.141	.038	.076	.079	.121	.049	.015			.010	.001	.002			
213	63.85	14.87	2.32	5.07	3.29	4.48	3.72	1.09	0.11		0.83	0.08	0.05	ZrO ₂ trace Cl none S 0.15 Cr ₂ O ₃ none BaO none SrO 0.04	99.95	
A1. I	1.064	.146	.014	.071	.082	.080	.060	.012			.010	—	—			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norma.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
198	(I)II.4.3.4.	Q 17.16 di 3.13 or 11.68 hy 8.25 ab 36.15 mt 2.78 an 19.46 il 0.91	Gebel Doukhan, Egypt.	Not stated.	J. Couyat, C. R., CXLVII, p. 868, 1908.	Andesite.	
199	"II.4(5).(2).3.4.	Q 10.86 di 4.32 or 12.79 hy 9.02 ab 40.35 mt 2.78 an 18.90 il 0.46	Kadero, Kordofan, Soudan.	D. Schimpff.	G. Linck, N. J. B. B., XVII, p. 420, 1903.	Malchite.	
200	II.4''3.4.	Q 12.84 di 2.72 or 11.12 hy 9.70 ab 25.15 mt 14.62 an 19.74 il 1.37 ap 1.34	Delen, Kordofan, Soudan.	Sprockhoff.	G. Linck, N. J. B. B., XVII, p. 435, 1903.	Gabbro porphyrite.	Al ₂ O ₃ corr. for P ₂ O ₅ . "With absorbed granite."
201	(1)II.(3)4.3''4.	Q 30.84 hy 3.60 or 10.01 mt 7.66 ab 22.01 hm 1.44 an 21.96 C 1.43	Bander Saleh, Abd el Keri, n. Socotra Island.	F. Eichleiter.	A. Pelikan, Ds. Ak. W. Wien., LXXI, p. 85, 1902.	Quartz diorite porphyrite.	
202	II.4.(2)3.(3)4.	Q 14.28 di 8.93 or 16.12 hy 9.12 ab 26.20 mt 3.94 an 13.62 il 3.50 ap 1.01	Ihovitika, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 20, 1913.	Hyalos- andesite.	
203	II.(3)4.3.(3)4.	Q 28.08 hy 11.56 or 10.56 mt 7.19 ab 17.82 ap 1.01 an 19.18 C 4.18	Palmietkine, East Rand, Transvaal.	H. Eckstein & Co.	C. B. Horwood, Tr. R. Soc. S. Af., XIII, p. 51, 1911.	Tonalite.	
204	(I)II.4.3''4.	Q 22.44 di 3.06 or 8.90 hy 5.55 ab 26.20 mt 3.71 an 25.30 il 1.27 ap 0.34	Copper Island, Commander Islands, Bering Sea.	Z. Starzynski.	Z. Starzynski, B. Ac. Sc. Crac., Ser. A, 1912, p. 659.	Andesite.	
205	II.4(5).3(4).4.	Q 11.46 di 10.15 or 8.90 hy 3.70 ab 27.77 mt 7.66 an 27.24 il 2.43 ap 0.67	Bering Island, Commander Islands, Bering Sea.	Z. Starzynski.	Z. Starzynski, B. Ac. Sc. Crac., Ser. A, 1912, p. 665.	Andesite.	
206	"II.4(5).3.4.	Q 9.72 di 2.48 or 12.79 hy 8.24 ab 34.06 mt 5.34 an 25.58	Deun-mo-lun, Northeast Tibet.	C. Pfeil.	K. Futterer, Durch Asien, III (4), p. 23, 1911.	Porphyry.	
207	"II.''4.3.4.	Q 26.82 di 6.47 or 7.78 hy 4.20 ab 29.34 mt 4.64 an 18.63	Usu, Iburi, Hokkaido, Japan.	Takaminé.	Pr. G. Soc. Jap., 1884?	Andesite pumice.	Not in W. T.
208	"II.4.3.(3)4.	Q 19.02 hy 11.67 or 15.57 mt 1.39 ab 27.77 il 1.82 an 21.68 ap 1.01	Ontake Volcano, Japan.	K. Yokoyama.	S. Kozu, pers. com.	Andesite.	
209	(I)II.4.3.4.	Q 16.26 hy 11.10 or 11.12 mt 0.70 ab 34.58 il 1.67 an 21.96 ap 1.01 C 0.92	Kurokami crater, Sakurajima Volcano, n. Kagoshima, Japan.	J. B. Ferguson.	F. A. Perret collector.	(Andesite.) Ash.	Eruption of 1914, A. L. Day, pers. com.
210	"II.4.3.4.	Q 16.56 di 2.07 or 15.01 hy 10.25 ab 30.92 mt 1.39 an 19.46 il 1.82 ap 0.67	Eboshidake, Norikura Volcano, Japan.	K. Yokoyama.	S. Kozu, pers. com.	Andesite.	
211	II.4''3''.(3)4.	Q 13.14 hy 18.93 or 12.79 mt 2.52 ab 22.01 il 1.22 an 24.46 C 2.96	Takahama, Izu Province, Japan.	C. Sugiura.	S. Kozu, pers. com.	Andesite.	
212	II.4.3.4.⊙	Q 15.84 di 9.24 or 8.34 hy 7.38 ab 25.68 mt 8.82 an 21.41 il 1.52 ap 0.34	Kashima, Izu Province, Japan.	T. Ohashi.	S. Kozu, pers. com.	Olivine andesite.	
213	II.4.3.4''.	Q 20.94 di 1.36 or 6.67 hy 13.74 ab 31.44 mt 3.25 an 20.57 il 1.52	Yercaud, Shevaroy Hills, Madras, India.	H. S. Washing- ton.	H. S. Washington, A. J. S., XLI, p. 328, 1916.	Charnockite (quartz hypers- thene diorite).	Cf. No. 214, p. 398.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
214	63.52	14.78	1.98	5.01	3.00	4.65	4.22	1.15	0.22		0.91		0.10		99.54	
A2. II	1.059	.145	.013	.069	.075	.083	.068	.012			.011		.001			
215	58.54	17.62	1.89	3.33	2.27	7.25	3.76	1.62	1.24	0.04	0.70	none	0.13	ZrO ₂ 0.01 Cl 0.04 F 0.05 S 0.04 Cr ₂ O ₃ 0.01 BaO 0.04 SrO 0.01	99.59	
A1. I	.976	.173	.012	.046	.082	.130	.061	.017			.009	—	.002			
216	57.49	18.40	5.46	1.71	3.05	7.61	3.38	1.99	1.61	0.14					100.84	
A3. III	.958	.180	.034	.024	.076	.136	.055	.021								
217	62.70	16.37	2.81	1.62	2.50	4.84	4.05	1.83	1.79	0.87	0.64				100.02	
A3. III	1.045	.160	.018	.022	.063	.087	.066	.020			.008					
218	66.53	15.96	2.65	2.89	1.99	2.96	4.05	1.60	1.11				0.19		99.93	2.740
A3. III	1.109	.156	.017	.040	.050	.053	.066	.017					.003			
219	57.70	16.36	4.20	3.47	3.41	7.32	3.22	2.11	1.14	0.16	0.71	0.14			99.94	
A2. II	.962	.160	.026	.049	.085	.130	.052	.022			.009	.001				
220	56.40	17.66	5.60	1.83	3.76	7.24	2.96	2.10	1.31	0.32	0.66	trace		S trace	99.84	
A2. II	.940	.173	.035	.025	.094	.129	.048	.022			.008	—				
221	55.99	18.19	4.10	3.85	3.02	8.27	3.28	1.53	0.99	0.20	0.70	0.13		S trace	100.25	
A2. II	.933	.178	.026	.054	.076	.148	.053	.016			.009	.001				
222	59.39	16.73	5.03	1.60	3.48	6.98	3.18	1.32	1.52		0.72	trace	0.10		100.05	
A2. II	.990	.164	.031	.022	.087	.125	.052	.014			.009	—	.001			
223	63.80	13.32	3.29	2.30	2.32	4.63	3.13	1.53	1.34	0.19	2.23	0.18	0.24	SO ₂ 0.40 BaO 0.70	99.60	2.72
A2. II	1.063	.131	.021	.032	.058	.082	.050	.016			.025	.001	.003			
224	58.50	17.54	3.32	2.56	2.93	7.04	3.48	1.62	1.23		1.41	0.23	0.08	BaO 0.10	100.05	2.495
A2. II	.975	.172	.021	.036	.073	.126	.056	.017			.018	.002	.001			
225	62.15	16.73	2.90	3.22	2.70	3.98	3.58	2.81	1.06	0.14	0.83	trace	0.12	CO ₂ 0.04 ZrO ₂ trace Cl trace S 0.11 Cr ₂ O ₃ none NiO 0.08 BaO none SrO none Li ₂ O none	100.45	2.61
A1. I	1.036	.164	.018	.044	.068	.071	.058	.030			.010	—	.002			
226	59.94	15.61	1.55	6.25	2.53	6.65	2.88	2.06	0.57	0.39	1.08	0.64			100.15	
A2. II	.999	.153	.010	.087	.063	.119	.047	.022			.014	.004				
227	60.26	16.46	1.15	4.87	3.09	5.25	4.23	0.98	2.22	0.22	0.84	0.29	0.08	CO ₂ none S 0.03 Cr ₂ O ₃ none BaO none SrO none	99.97	
A1. I	1.004	.161	.007	.068	.077	.094	.068	.010			.011	.002	.001			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
214	II.4.3.4(5).	Q 18.24 di 3.98 or 6.67 hy 11.05 ab 35.63 mt 3.02 an 18.07 il 1.67	Yercaud, Shevaroy Hills, Madras, India.	M. Kawamura.	Unpublished.	Charnockite.	Same specimen as No. 213.
215	II.4(5)3.4.	Q 10.44 di 7.85 or 9.45 hy 7.98 ab 31.96 mt 2.73 an 26.41 il 1.37	Benguet Road, Luzon, Philippine Islands.	E. W. Morley.	J. P. Iddings, pers. com.	Andesite.	
216	"II.4(5).3"4.	Q 11.16 di 6.91 or 11.68 hy 4.40 ab 28.82 mt 5.57 an 28.91 hm 1.60	Antamok River, Benguet, Luzon, Philippine Islands.	P. J. Fox.	A. J. Eveland, Philip. J. Sci., (A), II, p. 226, 1907.	Basalt.	
217	(I)II.4.3.4.	Q 18.20 di 2.81 or 11.12 hy 5.00 ab 34.58 mt 3.25 an 20.57 il 1.22 hm 0.64	Nangah Oeroli, Boe kit Loebock, Muller Moun- tains, Borneo.	M. Dittrich.	J. Schmutzer, Pr. K. Ac. Wet. Amst., 1908, p. 410.	Andesite.	
218	(I)II.4.(2)3.4.	Q 25.74 hy 8.43 or 9.45 mt 3.94 ab 34.58 an 14.73 C 2.04	Siboemboem, Sumatra.	L. Serrurier.	R. D. M. Verbeek, Sum. West K., p. 232, 1883.	Granite.	Not in W. T.
219	II.4"3.4.	Q 12.18 di 9.69 or 12.23 hy 5.76 ab 27.25 mt 6.03 an 23.91 il 1.37 ap 0.34	Si Nabun, Karoland, Sumatra.	M. Dittrich.	H. Stegmann, N. J. B. B., XXVII, p. 444, 1909.	Andesite.	
220	II.4(5).3(4)."4.	Q 11.64 di 5.62 or 12.23 hy 6.80 ab 25.15 mt 3.94 an 28.63 il 1.22 hm 2.88	Sibajak, Karoland, Sumatra.	M. Dittrich.	H. Stegmann, N. J. B. B., XXVII, p. 441, 1909.	Andesite.	
221	II.4(5).3(4).4.	Q 10.02 di 8.68 or 8.90 hy 5.95 ab 27.77 mt 6.03 an 30.30 il 1.37 ap 0.34	Su Kanulu, Si Nabun, Karoland, Sumatra.	M. Dittrich.	H. Stegmann, N. J. B. B., XXVII, p. 445, 1909.	Andesite.	
222	II.4.3(4).4.	Q 17.04 di 5.83 or 7.78 hy 6.00 ab 27.25 mt 3.25 an 27.24 il 1.37 hm 2.72	Tunleo, Kaiser Wilhelm Land, New Guinea.	E. Ludwig.	S. Richarz, N. J. B. B., XXIX, p. 445, 1910.	Andesite.	
223	"II."4.3.4.	Q 27.42 di 4.75 or 8.90 hy 3.60 ab 26.20 mt 2.32 an 18.07 il 3.80 hm 1.76 ap 0.34	Ndoera River, Flores Island.	A. Lindner.	G. Rack, N. J. B. B., XXXIV, p. 79, 1912.	Andesite.	BaO high?
224	"II.4"3"4.	Q 14.34 di 5.83 or 9.45 hy 4.60 ab 29.34 mt 4.41 an 27.52 il 2.74 hm 0.32 ap 0.67	Tandjoeng Lok, Sumbawa Island.	A. Lindner.	G. Rack, N. J. B. B., XXXIV, p. 52, 1912.	Andesite.	
225	(I)II.4.3."4.	Q 16.80 hy 9.18 or 16.68 mt 4.18 ab 30.39 il 1.52 an 19.74 C 0.51	Bankfoot House, Glasshouse Mountains, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 169, 1906.	Dacite.	
226	II.4.3."4.	Q 16.14 di 5.10 or 12.23 hy 12.06 ab 24.63 mt 2.32 an 23.35 il 2.13 ap 1.34	Glenrock Falls, Merulam, New South Wales.	G. J. Barrows.	W. G. Woolnough, Pr. Linn. Soc. N. S. W., XXXIV, p. 797, 1909.	Granodiorite.	
227	II.4"3.4(5).	Q 14.28 di 0.92 or 5.56 hy 13.97 ab 35.63 mt 1.62 an 23.07 il 1.67 ap 0.67	Currabubula, New South Wales.	W. N. Benson.	W. N. Benson, pers. com.	Hypersthene andesite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
228	66.86	14.91	4.06	3.65	1.28	3.25	4.22	1.49	0.58	0.09			trace		100.39		
A3. III	1.114	.146	.026	.051	.032	.058	.068	.016					—				
229	62.56	16.60	1.02	5.98	2.70	4.30	2.98	2.57	0.68	0.18	1.10	0.17	trace	CO ₂ Cl S Li ₂ O	none trace none trace	100.85	2.773
A2. II	1.043	.163	.006	.083	.068	.077	.048	.028			.014	.001	—				
230	62.04	16.50	0.66	6.67	3.06	4.56	2.27	2.14	0.54	0.16	1.16	0.19	trace	CO ₂ Cl S Li ₂ O	none trace none none	99.95	2.789
A2. II	1.034	.162	.004	.093	.077	.081	.037	.022			.015	.001	—				
231	63.62	14.38	3.29	3.47	3.13	5.43	4.40	1.20	0.06	0.22	0.72		0.28	CO ₂ S	none none	100.20	2.76
A2. II	1.060	.141	.021	.049	.078	.096	.071	.013			.009		.004				
232	59.35	15.83	5.41	1.76	4.58	6.43	3.38	0.90	0.83	0.07	0.78		0.33	CO ₂ FeS ₂	0.06 0.07	99.78	2.86
A2. II	.989	.155	.034	.025	.115	.114	.055	.010			.010		.005				
233	56.74	15.46	3.08	7.58	2.54	7.64	3.08	1.59	1.28		1.26	0.15	trace		100.40	2.906	
A2. II	.946	.131	.019	.106	.064	.137	.050	.017			.016	.001	—				
234	61.25	16.53	1.28	3.60	3.19	4.95	3.71	2.10	1.82	0.82	0.58	0.02		CO ₂	0.40	100.25	
A2. II	1.021	.162	.008	.050	.080	.089	.060	.022		.010	.004	—					
235	59.20	18.03	1.40	2.88	2.51	7.03	2.93	2.28	2.08		1.26		0.40	CO ₂	none	100.00	
A2. II	.987	.173	.015	.040	.063	.125	.047	.024			.016		.006				
236	58.90	17.89	2.67	3.42	2.64	6.40	2.92	1.75	1.13	1.32	0.78	0.25	0.09		100.16		
A2. II	.982	.175	.017	.047	.066	.114	.047	.019			.010	.002	.001				
237	58.83	19.51	3.28	3.67	1.64	5.38	2.49	2.22	0.56	1.24	0.82	0.32	0.08	CO ₂	none	100.04	
A2. II	.981	.195	.021	.051	.041	.096	.040	.023			.010	.002	.001				
238	51.65	15.07	2.08	9.65	5.48	6.04	2.57	0.98	1.85		3.53	1.15	0.07	CO ₂	none	100.12	
A2. II	.861	.148	.013	.134	.137	.108	.042	.010			.044	.008	.001				
239	54.01	17.49	6.61	5.60	3.15	7.26	3.12	1.48	0.93						99.65		
A3. III	.900	.171	.041	.078	.079	.130	.050	.016									
240	59.85	16.90	1.92	5.22	3.12	6.63	3.45	1.28	0.87		0.84	0.06			100.08		
A2. II	.998	.166	.012	.072	.078	.118	.056	.014			.011	—					
241	62.97	14.75	2.98	3.31	2.12	5.51	3.78	1.21	2.15		0.10	0.07	0.17		99.12		
B2. III	1.050	.145	.019	.046	.053	.098	.061	.013			.001	—	.002				
242	55.33	14.72	6.11	5.34	3.91	7.56	3.23	1.26	1.57		0.14	0.53	0.18		99.88		
A2. II	.922	.144	.038	.074	.098	.135	.052	.014			.002	.004	.003				
243	61.79	16.20	2.64	3.62	1.96	4.68	3.69	2.98	0.78		1.22	0.28			99.84		
A2. II	1.030	.159	.017	.050	.049	.084	.060	.032			.015	.002					

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
228	(I)II.4.'3.4.	Q 26.22 hy 6.50 or 8.90 mt 6.03 ab 35.63 an 16.12 C 0.41	Nekeeya, Ripon County, Victoria.	H. C. Jenkins.	A. W. Howitt, Rec. G. S. Vict., I (1), p. 40, 1902.	Quartz diorite.	
229	II.4.3.(3)4.	Q 18.48 hy 15.12 or 15.57 mt 1.39 ab 25.15 il 2.13 an 20.57 ap 0.34 C 1.33	Willmingtonong Creek, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 17, 1912.	Dacite.	
230	II.4.3''.(3)4.	Q 22.38 hy 17.47 or 12.23 mt 0.93 ab 19.39 il 2.28 an 21.68 ap 0.34 C 2.55	Cherokees, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 17, 1912.	Dacite.	
231	II.4.(2)3.4''.	Q 18.66 di 8.71 or 7.23 hy 5.75 ab 37.20 mt 4.87 an 15.85 il 1.37	Cue, West Australia.	E. S. Simpson.	C. G. Gibson, W. Aust. G. S. B. 14, p. 14, 1904.	Granodiorite.	
232	II.4.3''4(5).	Q 16.80 di 5.18 or 5.56 hy 9.10 ab 28.82 mt 4.64 an 25.02 il 1.52 hm 2.24	Mount Margaret Goldfield, West Australia.	Not stated.	C. G. Gibson, W. Aust. G. S. B. 24, p. 15, 1906.	Diorite.	
233	II.4(5).3.4.	Q 11.46 di 11.63 or 9.45 hy 9.94 ab 26.20 mt 4.41 an 23.35 il 2.43 ap 0.34	Northwest Bay, n. Hobart, Tasmania.	R. Pohl.	F. P. Paul, T. M. P. M., XXV, p. 316, 1906.	Quartz diabase.	
234	''II.4.3.4.	Q 15.90 hy 12.22 or 12.23 mt 1.86 ab 31.44 il 1.52 an 21.13 ap 1.34 C 0.41	Slug Creek, Orikaka District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Diorite.	
235	''II.4.3''.'4.	Q 15.36 di 5.13 or 13.34 hy 5.82 ab 24.63 mt 3.48 an 28.36 il 2.43	Coal Point, North Cape, New Zealand.	J. S. MacLaurin.	Bell and Clarke, G. S. N. Z. B. 8, p. 68, 1909.	Andesite.	
236	''II.4.3(4).4.	Q 15.30 hy 9.37 or 10.56 mt 3.94 ab 24.63 il 1.52 an 29.75 ap 0.67 C 0.20	Aroha, Hauraki, New Zealand.	Surv. lab.	Henderson and Bartrum, N. Z. G. S. B. 16, p. 62, 1913.	Pyroxene andesite.	
237	(I)II.4.3''.(3)4.	Q 21.78 hy 6.87 or 12.79 mt 4.87 ab 20.96 il 1.52 an 24.74 ap 0.67 C 4.39	Kirikiri Creek, Te Puke District, New Zealand.	Not stated.	J. A. Bartrum, G. S. N. Z. Mines Statem. (1912), p. 141, 1913.	Andesite.	
238	II(III).4''3(4).4.	Q 10.32 hy 24.00 or 5.56 mt 3.02 ab 22.01 il 6.69 an 22.52 ap 2.69 C 1.53	Stillwater Creek, Mohikiniui, West- port District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Diorite.	
239	II.4(5).3(4).4.	Q 9.18 di 5.66 or 8.90 hy 10.03 ab 26.20 mt 9.51 an 29.19	St. Paul Island, Atlantic Ocean.	R. Reinisch.	R. Reinisch, D. Südp. Exp., II (5), p. 390, 1909.	Basalt.	
240	II.4''3''4.	Q 14.22 di 5.01 or 7.78 hy 11.81 ab 29.34 mt 2.78 an 26.69 il 1.67	Wandel Island, Graham Land, Antarctica.	Pisani.	G. Gourdon, Exp. Ant. Fr., Petr. Vol., p. 151, 1908.	Quartz diorite.	
241	''II.4.3.4''.	Q 21.36 di 6.22 or 7.23 hy 6.01 ab 31.96 mt 4.41 an 19.74 il 0.15	Banck Island, 64° 51' S., 62° 46' W., Danco Land, Antarctica.	E. Zdarek.	A. Pelikan, Voy. Belgica, V, Petr. Unt., I, p. 45, 1909.	Malchite.	
242	II.4''3.4.	Q 11.46 di 9.88 or 7.78 hy 9.90 ab 27.25 mt 8.82 an 21.68 il 0.30 ap 1.34	Moreno Island, 64° 4' S., 61° 20' W., Antarctica.	E. Zdarek.	A. Pelikan, Voy. Belgica., V, Petr. Unt., I, p. 7, 1909.	Quartz diorite.	
243	(I)II.4.'3.'4.	Q 16.02 di 2.26 or 17.79 hy 6.18 ab 31.44 mt 3.94 an 18.63 il 2.28 ap 0.67	Sounding, 70° S., 81° W. Paris, Weddell Quadrant, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Diorite.	Dredged block.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
244	58.85	17.48	2.98	3.27	2.53	6.24	3.56	1.97	2.03		0.82	0.12			99.85	
A2. II	.981	.171	.019	.046	.063	.112	.057	.021			.010	.001				
245	55.15	17.56	4.12	4.46	3.27	6.94	3.18	1.31	1.88		1.57	0.21			99.75	
A2. II	.919	.172	.026	.062	.082	.124	.052	.014			.020	.001				

RANG 3. ALKALICALCIC. TONALASE.

1	56.72	15.06	1.73	6.33	2.58	6.61	4.73	0.69	0.51	0.15	4.04	0.40	0.35	CO ₂ none	99.91	
A2. II	.945	.148	.011	.088	.065	.118	.076	.007			.051	.003	.005			
2	50.36	17.37	8.13	4.33	3.57	4.29	4.74	0.08	2.73	0.16	3.10	0.63	0.24	CO ₂ trace	99.73	
A2. II	.839	.170	.051	.060	.089	.077	.077	.001			.039	.004	.003			
3	62.32	15.79	3.57	4.61	2.53	3.65	4.51	0.76	1.89		0.06		0.35	CO ₂ none	100.04	
A2. II	1.039	.155	.023	.064	.063	.065	.073	.008			.001		.005			
4	56.60	17.84	2.55	4.09	3.16	6.28	4.45	0.45	3.20		1.59	0.14	trace	BaO none SrO none	100.35	
A2. II	.943	.175	.016	.057	.079	.114	.072	.005			.020	.001	—			
5	60.40	16.89	1.88	3.72	3.82	7.25	3.80	0.77	0.20	0.09	0.61	0.16	0.12	CO ₂ none FeS ₂ 0.08 NiO 0.02 BaO 0.06 SrO trace Li ₂ O trace	99.87	
A1. I	1.007	.165	.012	.052	.096	.129	.061	.008			.008	.001	.002			
6	64.67	16.62	0.51	0.76	2.26	9.50	4.10	0.34	0.37	0.08	0.51	0.12	trace	BaO 0.02 SrO trace Li ₂ O trace	99.86	
A2. II	1.078	.163	.003	.011	.047	.169	.066	.003			.006	.001	—			
7	60.09	16.43	2.28	3.01	4.37	5.76	4.52	0.70	1.16	0.20	0.63	0.12	0.12	CO ₂ 0.07 SO ₂ trace FeS ₂ 0.34 BaO trace SrO trace Li ₂ O none	99.80	
A1. I	1.002	.161	.014	.042	.109	.103	.072	.007			.008	.001	.002			
8	61.37	15.41	3.15	3.89	3.48	4.42	3.76	0.34	2.70	0.29	0.60	0.08	0.47	BaO 0.08 SrO trace Li ₂ O none	100.04	
A2. II	1.023	.151	.020	.054	.087	.078	.060	.003			.007	—	.007			
9	64.22	16.36	2.93	2.50	1.94	5.85	3.96	0.73	0.84		0.21	trace			99.54	2.598
A3. III	1.070	.160	.018	.035	.049	.104	.064	.008			.003	—				
10	56.63	17.01	6.15	2.80	4.08	6.83	4.48	0.25	1.17		0.18	0.28	0.05	CO ₂ 0.02 ZrO ₂ trace Cl 0.06 S none NiO none BaO none Cu 0.04 Pb none	100.02	
A1. I	.944	.164	.039	.039	.102	.121	.072	.003			.002	.002	—			
11	61.80	18.65	2.08	2.49	2.60	6.41	4.51	0.82	0.25		0.50	0.18	0.08	S 0.01	100.66	
A2. II	1.030	.183	.013	.035	.065	.114	.073	.009			.006	.001	.001			
12	61.35	17.84	4.13	2.28	1.81	6.08	4.39	0.45	0.52		0.32		0.37		99.54	
A2. II	1.023	.175	.026	.032	.045	.109	.071	.005			.004		.005			
13	56.96	14.65	9.16	4.87	1.65	4.56	4.93	0.85	2.10	0.19	0.31	0.09		CO ₂ trace	100.32	2.90
A2. II	.949	.144	.058	.068	.041	.081	.079	.009			.004	—				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4. DOSODIC. TONALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
244	"II.4".3.4.	Q 13.86 di 3.59 or 11.68 hy 6.82 ab 29.87 mt 4.41 an 25.85 il 1.52 ap 0.34	Berthelot Island, Weddell quad- rant, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Quartz diorite.	
245	II.4(5).3(4).4.	Q 11.88 di 3.30 or 7.73 hy 8.75 ab 27.25 mt 6.03 an 29.47 il 3.04 ap 0.34	Jenny Island, Weddell quad- rant, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Andesite.	

SUBRANG 5. PERSODIC. PLACEROSE. (C. I. P. W., 1902.)

1	II.4(5).3."5.	Q 10.68 di 10.75 or 3.89 hy 5.84 ab 39.82 mt 2.55 an 18.07 il 7.55 ap 1.01	Sheepscot River, Boothbay quadrangle, Maine.	M. W. Adams.	I. H. Ogilvie, Ann. N. Y. Ac. Sci., XVII, p. 549, 1907.	Diabase.	
2	II.4".3.5.	Q 9.60 hy 8.90 or 0.56 mt 5.57 ab 39.52 il 5.93 an 17.79 hm 4.32 C 2.96 ap 1.34	South Mountain, Fairchild quadrangle, Pennsylvania.	W. T. Schaller.	F. Bascom, U. S. G. S. Rec. lab.	Metabasalt.	
3	II.4.3.(4)5.	Q 18.90 hy 12.24 or 4.45 mt 5.34 ab 38.25 il 0.15 an 18.07 C 0.92	Virgilina, Granville County, North Carolina.	T. L. Watson.	T. L. Watson, B. G. S. A., XIII, p. 364, 1902.	"Greenstone" (andesite).	
4	II.4(5).3."5.	Q 10.32 di 2.91 or 2.78 hy 9.26 ab 37.73 mt 3.71 an 27.24 il 3.04 ap 0.34	Little Saganaga Lake, Minnesota.	A. N. Winchell.	A. N. Winchell, Am. G., XXVI, p. 352, 1900.	Quartz gabbro.	In W. T., p. 285.
5	II.4".3"(4)5.	Q 14.46 di 6.74 or 4.45 hy 10.83 ab 31.96 mt 2.78 an 26.69 il 1.22 ap 0.34	St. Augustine Volcano, Cooks Inlet, Alaska.	W. F. Hille- brand.	G. F. Becker, U. S. G. S. A. R. 18, III, p. 52, 1898.	Augite- bronzite andesite.	In W. T., p. 245.
6	(I)II.4.3".5.	Q 21.30 di 10.64 or 1.67 wo 2.67 ab 34.58 mt 0.70 an 26.13 il 0.91 ap 0.34	English Mountain, Placer County, California.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. B. 148, p. 212, 1897.	Augite granite.	In W. T., p. 245.
7	II.4".3."5.	Q 12.90 di 3.99 or 3.89 hy 11.91 ab 37.73 mt 3.25 an 22.80 il 1.22 ap 0.34	Ophir District, Placer County, California.	W. F. Hille- brand.	W. Lindgren, U. S. G. S. A. R. 14, II, p. 262, 1894.	Camptonite.	In W. T., p. 245.
8	II.4.3.5.⊙	Q 22.08 hy 13.19 or 1.67 mt 4.64 ab 31.44 il 1.06 an 21.68 C 1.02	Jenny Lind, Calaveras County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 473, 1894.	Porphyrite.	In W. T., p. 245.
9	(I)II.4.3.(4)5.	Q 22.98 di 3.63 or 4.45 hy 5.02 ab 33.54 mt 4.18 an 24.46 il 0.46	Xico Island, Lake Chalco, Mexico.	A. Röhrig.	H. Lenk, Btr. G. Mex., II, p. 233, 1899.	Hornblende andesite.	In W. T., p. 245.
10	II.4(5).3.5.	Q 11.34 di 5.40 or 1.67 hy 7.70 ab 37.73 mt 5.58 an 24.74 il 0.30 hm 0.32 ap 0.67	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 77, 1908.	Mica diorite.	In W. T., p. 245.
11	"II.4".3.(4)5.	Q 14.70 di 2.22 or 5.00 hy 7.55 ab 38.25 mt 3.02 an 28.08 il 0.91 ap 0.34	Mount Burney, Smyth Canal, Patagonia, Chile.	G. Nyblom.	P. D. Quensel, B. G. Inst. Ups., XI, p. 107, 1911.	Hypersthene andesite.	
12	(I)II.4.3".5.	Q 18.42 di 2.22 or 2.78 hy 4.36 ab 37.20 mt 6.03 an 27.52 il 0.61	Stjärnvik, Huseby, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VII, p. 264, 1906.	Granite.	
13	II.4".(2)3.(4)5.	Q 14.22 di 5.50 or 5.00 hy 2.30 ab 41.39 mt 13.46 an 15.57 il 0.61	Kernize, Montenegro.	E. Manasse.	E. Manasse, Fr. Soc. Tosc., XIII, p. 164, 1903.	Diorite porphyry.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. TONALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
14	59.48	19.57	3.30	4.65	1.30	6.14	3.85	0.46	1.48						100.23	
A3. III	.991	.192	.021	.065	.033	.110	.062	.005								
15	57.66	18.15	2.02	6.01	2.06	7.97	3.86	0.48	1.46						99.67	
A3. III	.961	.178	.013	.083	.052	.143	.062	.005								
16	60.13	18.13	3.25	0.91	3.35	6.54	3.78	.077	0.90	1.45	0.44	0.06	0.27	ZrO ₂ none Cl 0.09 F 0.02 S 0.02 Cr ₂ O ₃ none BaO 0.03 SrO 0.01	100.15	
A1. I	1.002	.178	.020	.013	.084	.117	.061	.008			.006	—	.004			
17	65.48	14.37	3.51	3.09	1.09	4.58	4.20	0.72	1.73		0.83				99.60	2.61
A3. III	1.091	.141	.022	.043	.027	.082	.068	.008			.010					
18	58.79	17.51	2.11	3.87	2.23	6.18	4.84	0.68	2.61	0.71	1.21			CO ₂ trace	100.74	
A3. III	.980	.172	.013	.054	.056	.111	.078	.007			.015					
19	55.27	16.59	6.03	5.81	2.80	6.65	4.23	0.64	1.59		trace	0.52	trace		100.13	
A3. III	.921	.163	.038	.081	.070	.119	.068	.007			—	.004	—			

RANG 4. DOALCIC. BANDASE. (C. I. P. W., 1902.)

1	56.15	17.57	4.22	4.05	4.17	6.72	0.74	2.45	2.24		trace	0.35	0.82	CO ₂ 0.28	99.76	2.84
A2. II	.936	.172	.026	.057	.104	.120	.012	.027			—	.002	.012			
2	55.48	19.61	4.06	6.05	3.06	8.75	0.15	1.94	1.18						100.28	
A3. III	.925	.192	.025	.084	.077	.156	.002	.021								
3	57.98	18.18	2.00	4.59	3.67	7.28	1.26	4.07	0.45		0.84	0.12			100.44	
A2. II	.966	.178	.013	.064	.092	.130	.020	.043			.011	.001				

RANG 4. DOALCIC. BANDASE.

1	52.63	16.76	2.86	10.74	4.33	6.17	1.41	2.29	1.17	0.12	0.62	0.33	0.38	CO ₂ 0.10	99.91	3.020
A2. II	.877	.164	.018	.149	.108	.110	.023	.024			.008	.002	.005			
2	59.78	16.43	0.92	6.84	2.94	9.15	1.44	2.36	0.93	0.12					100.91	
A3. III	.996	.161	.006	.095	.074	.164	.023	.026								
3	58.61	16.39	2.36	5.53	3.45	6.06	2.04	2.03	1.94		0.83	0.36		SO ₂ 0.32	99.92	2.850
A2. II	.977	.161	.015	.076	.086	.108	.033	.021			.010	.003				
4	50.85	16.72	4.31	10.25	2.45	7.25	2.01	1.86	1.15		1.96	0.57		CO ₂ 0.09 SO ₂ 0.15 Org 0.07	99.69	2.976
A2. II	.848	.164	.027	.143	.061	.130	.032	.020			.025	.004				
5	60.50	15.95	6.27	2.89	3.82	6.51	1.65	2.24	0.84						100.67	2.69
A3. III	1.008	.156	.039	.040	.096	.116	.027	.023								

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 5. PERSODIC. PLACEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
14	(I)II.4.3(4).''5.	Q 17.52 hy 9.11 or 2.78 mt 4.87 ab 32.49 an 30.58 C 1.53	Shirebeshi, Hokkaido, Japan.	Takamine.	Pr. G. Soc. Jap. 1884?	Andesite.	
15	II.4(5).3(4).''5.	Q 10.98 di 7.49 or 2.78 hy 10.66 ab 32.49 mt 3.02 an 30.86	Kunishiri, Chishima, Japan.	Takamine.	Pr. G. Soc. Jap. 1884?	Andesite.	
16	(I)II.4.3(4).(4)5.	Q 16.68 di 1.73 or 4.45 hy 7.60 ab 31.96 mt 2.55 an 30.30 il 0.91 hm 1.44	Olongapo, Luzon, Philippine Islands.	E. W. Morley.	J. P. Iddings, pers. com.	Andesite.	
17	(I)II.''4.3.(4)5.	Q 27.00 di 3.83 or 4.45 hy 2.29 ab 35.63 mt 5.10 an 18.07 il 1.52	Manoe-Bala River, Flores Island.	Tillmans.	G. Rack, N. J. B. B., XXXIV, p. 75, 1912.	Dacite.	
18	''II.4(5).3.''5.	Q 11.40 di 5.44 or 3.89 hy 6.38 ab 40.87 mt 3.02 an 24.19 il 2.28	Pokolbin, New South Wales.	Not stated.	Browne and Walkom, Pr. R. Soc. N. S. W., p. 404, 1911.	Pitchstone.	
19	II.4(5).3.(4)5.	Q 9.78 di 3.98 or 3.89 hy 10.78 ab 35.63 mt 8.82 an 24.46 il 1.34	Cape Anna Osterrieth, Dancoland, Antarctica.	E. Zdarek.	A. Pelikan, Voy. Belgica, V, Pet. Unt., I, p. 21, 1909.	Quartz diorite.	

SUBRANG 1-2. PREPOTASSIC. SAGAMOSE. (C. I. P. W., 1902.)

1	II.4.4.2.⊙	Q 19.74 hy 16.08 or 15.01 mt 6.03 ab 6.29 ap 0.67 an 31.41 C 2.04	Ping-you-ki, Nan-shan, China.	C. Pfeil.	K. Futterer, Durch Asien, II (2), p. 47, 1909.	Quartz diorite.	
2	II.4.4(5).1.	Q 20.34 hy 15.49 or 11.68 mt 5.80 ab 1.05 an 43.37 C 1.33	Hokizawa, Sagami, Japan.	Not stated.	T. Harada, Jap. Inseln, p. 118, 1890.	Tonalite.	In W. T., p. 247.
3	II.4''.(3)4.2''.	Q 12.84 di 2.72 or 23.91 hy 13.15 ab 10.48 mt 3.02 an 31.97 il 1.67 ap 0.34	Wedel Island, Weddell quad- rant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Quartz-mica diorite.	

SUBRANG 3. SODIPOTASSIC.

1	II''4(5).4.3.	Q 8.34 hy 27.70 or 13.34 mt 4.18 ab 12.05 il 1.22 an 30.58 ap 0.67 C 0.71	Moyie Sill, Purcell Moun- tains, British Columbia.	M. Dittrich.	R. A. Daly, Ros. Fests., p. 217, 1906.	Quartz gabbro.	Also in Can. G. S. Mem. 38 (I), p. 232, 1912.
2	II.4.4.3.⊙	Q 15.78 di 12.13 or 14.46 hy 13.05 ab 12.05 mt 1.39 an 31.14	Glendalough, County Wicklow, Ireland.	J. A. Thompson.	J. A. Thompson, Q. J. G. S., LXIV, p. 489, 1908.	Quartz diorite.	"Mixed rock."
3	II.4.(3)4.3(4).	Q 19.20 hy 15.33 or 11.68 mt 3.48 ab 17.29 il 1.52 an 27.24 ap 1.01 C 0.92	Gruhe, Brocken, Harz.	Eyme.	O. H. Erdmannsdörfer, Jb. Pr. G. L.-A., XXVII, p. 357, 1906.	Quartz diorite.	
4	II.4(5).''4.3(4).	Q 9.30 di 1.18 or 11.12 hy 17.52 ab 16.77 mt 6.26 an 31.14 il 3.80 ap 1.34	Bastebeck, Brocken, Harz.	Haefcke.	O. H. Erdmannsdörfer, Jb. Pr. G. L.-A., XXVII, p. 363, 1906.	Mica-augite diorite.	
5	II.4.''4.3.	Q 23.40 di 2.16 or 12.79 hy 8.60 ab 14.15 mt 9.05 an 29.47	Unkersdorf, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 752, 1886.	Porphyrite.	In W. T., p. 247.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. BANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
6	55.7	18.8	5.9	1.8	6.0	6.5	1.4	1.8	1.8						99.7	
B3. IV	.926	.184	.037	.025	.150	.116	.023	.019								
7	61.35	18.24	2.00	4.62	2.69	6.35	1.88	1.80	1.41		trace		trace		100.34	2.790
A3. III	1.023	.179	.013	.064	.067	.114	.030	.019			—		—			
8	59.84	18.70	2.96	4.20	2.79	6.70	2.28	1.38	0.70		0.32	0.48	0.07		100.42	
A2. II	.997	.183	.019	.058	.070	.120	.037	.023			.004	.003	.001			
9	51.15	15.92	9.34	2.87	6.48	10.40	1.19	1.61	0.11		0.44	0.06	0.09		99.66	3.19
A2. II	.853	.156	.058	.040	.162	.185	.019	.017			.006	—	.001			
10	63.41	16.50	2.53	3.36	2.74	5.80	1.90	2.26	1.55			0.10	trace		100.15	2.498
A3. III	1.057	.161	.015	.047	.069	.103	.030	.024				.001	—			
11	57.68	18.84	4.96	1.44	4.00	6.05	2.16	2.15	0.90		0.82		0.21		99.96	
A2. II	.961	.185	.031	.020	.100	.108	.035	.023			.010		.003			
12	52.30	16.29	3.20	7.09	4.17	6.90	1.38	2.44	2.23	0.45	3.46	0.25	0.07	SO ₃ 0.11	100.34	
A2. II	.872	.160	.020	.099	.104	.123	.023	.036			.043	.002	.001			

RANG 4. DOCALCIC. BANDASE.

1	58.57	16.10	2.89	6.12	2.33	7.39	2.11	1.01	1.27	0.21	1.41	0.37	0.18	CO ₂ none ZrO ₂ 0.09 S trace Cr ₂ O ₃ none V ₂ O ₅ 0.02 NiO none BaO trace SrO trace Li ₂ O trace	100.07	2.890
A1.	.976	.158	.018	.085	.058	.132	.034	.011			.018	.003	.003			
2	55.16	17.51	2.62	5.83	4.35	8.50	1.83	1.08	2.01	0.18	0.64	0.21	0.15	CO ₂ none ZrO ₂ 0.02 FeS ₂ 0.03 Cr ₂ O ₃ trace V ₂ O ₅ 0.04 NiO 0.01 BaO trace SrO trace Li ₂ O trace	100.17	2.902
A1. I	.919	.174	.016	.081	.109	.145	.029	.012			.008	.002	.002			
3	55.97	15.60	1.21	6.28	6.83	7.31	2.23	1.25	1.85	0.18	1.11	0.16	0.08	Cr ₂ O ₃ 0.04	100.10	
A2. II	.933	.153	.007	.088	.171	.130	.036	.014			.013	.001	.001			
4	56.41	15.19	1.60	6.24	7.18	6.77	2.21	1.34	2.00	0.08	0.69	0.05	0.11	ZrO ₂ 0.14 Cr ₂ O ₃ 0.05	100.06	
A1. I	.940	.149	.010	.087	.180	.121	.035	.014			.009		.002			
5	53.16	15.12	5.95	6.75	4.76	5.74	2.38	1.54	1.92	0.38	1.68	0.09	0.17	CO ₂ 0.05 BaO 0.02 CuO 0.02	99.75	2.882
A1. I	.886	.148	.037	.094	.119	.103	.039	.016			.021	.001	.002			
6	50.48	16.33	5.99	7.10	4.08	6.47	2.44	1.39	2.70	0.46	2.15	0.21	0.16	CO ₂ 0.01 S 0.01 BaO 0.04 CuO 0.02	100.04	2.886
A1. I	.841	.160	.038	.099	.102	.116	.039	.015			.027	.001	.002			
7	52.31	18.35	5.90	11.06	1.00	7.33	2.90	0.49	0.35						99.69	
A3. III	.872	.180	.037	.154	.025	.130	.047	.005								

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBBRANG 3. SODI POTASSIC—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
6	II.4.4.3.⊙	Q 17.52 hy 15.00 or 10.56 mt 5.80 ab 12.05 hm 1.92 an 32.25 C 2.65	Fuchsberg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 182, 1902.	Lampro- phyre.	
7	II.4.4.3(4).	Q 22.98 hy 13.43 or 10.56 mt 3.02 ab 15.72 an 31.69 C 1.63	Taufers, Rieserferner, Tyrol.	T. Panzer.	F. Becke, Ds. Ak. W. Wien, LXXV (1), p. 160, 1913.	Tonalite.	Cf. No. 55, II.4.3.3.
8	II.4.(3)4.3(4).	Q 18.66 hy 11.18 or 12.79 mt 4.41 ab 19.39 fl 0.61 an 30.58 ap 1.01 C 1.33	Brixen, Tyrol.	C. v. John.	W. Petrascheck, Jb. G. R.-A., Wien, LIV, p. 62, 1905.	Tonalite gneiss.	
9	II(III).4''4.3.	Q 10.20 di 14.04 or 9.45 hy 9.70 ab 9.96 mt 8.12 an 33.36 fl 0.91 ap 3.68	Seven Pagodas, Chingelput District, Madras, India.	P. Brühl.	T. H. Holland, Rec. G. S. Ind., XXX, p. 35, 1897.	Augite diorite.	Also in Q. J. G. S., LIII, p. 409, 1897. In W. T., p. 247.
10	(I)II.4.(3)4.3.	Q 25.56 hy 11.12 or 13.34 mt 3.48 ab 15.72 ap 0.34 an 27.80 C 0.71	Singalang Volcano, Sumatra.	K. Sillib.	A. Merian, N. J. B. B., III, p. 302, 1885.	Hypersthene andesite.	In W. T., p. 247.
11	II.4.''4.3(4).	Q 17.82 hy 10.00 or 12.79 mt 3.02 ab 18.34 fl 1.52 an 30.02 hm 2.88 C 1.94	Beesons Island, Coromandel, Hauraki, New Zealand.	J. J. MacLaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 82, 1907.	Hypersthene andesite.	
12	II.4(5).(3)4.(2)3.	Q 9.48 di 3.17 or 20.02 hy 13.86 ab 12.05 mt 4.64 an 28.08 fl 6.54 ap 0.67	Mount Albert, Waitahu, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Mica vogesite.	

SUBBRANG 4-5. PRESODIC. BANDOSE. (C. I. P. W., 1902.)

1	II.4.4.4.⊙	Q 21.66 di 2.07 or 6.12 hy 11.64 ab 17.82 mt 4.18 an 31.41 fl 2.74 ap 1.01	Stone Run, Cecil County, Maryland.	W. F. Hille- brand.	A. G. Leonard, Am. G., XXVIII, p. 146, 1901.	Quartz diorite.	In W. T., p. 247.
2	II.4.4.4.⊙	Q 13.98 di 1.36 or 6.67 hy 18.02 ab 15.20 mt 3.71 an 36.97 fl 1.22 ap 0.67	Octoraro Creek, Cecil County, Maryland.	W. F. Hille- brand.	A. G. Leonard, Am. G., XXVIII, p. 146, 1901.	Quartz diorite.	In W. T., p. 247.
3	II(III).4(5)''4.4	Q 9.78 di 5.40 or 7.78 hy 23.58 ab 18.86 mt 1.62 an 28.63 fl 1.98 ap 0.34	Triadelphia, Montgomery County, Maryland.	W. F. Hille- brand.	G. H. Williams, U. S. G. S. A. R. 15, p. 673, 1895.	Biotite diorite.	In W. T., p. 247.
4	II''4''''4.4.	Q 10.50 di 4.73 or 7.78 hy 24.95 ab 15.34 mt 2.32 an 27.80 fl 1.37	Georgetown, District of Columbia.	W. F. Hille- brand.	G. H. Williams, U. S. G. S. A. R. 15, p. 673, 1895.	Biotite diorite.	In W. T., p. 247.
5	II.4''.(3)4.4.	Q 12.36 di 1.57 or 8.90 hy 16.15 ab 20.44 mt 8.58 an 25.85 fl 3.19 ap 0.34	Crooked Creek, Pine County, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 648, 1910.	Diabase.	
6	II.4(5)''4.4.	Q 9.60 di 1.61 or 8.34 hy 14.19 ab 20.44 mt 8.82 an 29.47 fl 4.10 ap 0.34	Kettle River, n. Hinckley, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 650, 1910.	Porphyritic diabase.	
7	II.4(5).4.(4)5.	Q 9.60 di 0.49 or 2.78 hy 17.68 ab 24.63 mt 8.58 an 35.58	Granite Falls, Yellow Medicine County, Minnesota.	H. N. Stokes.	W. S. Bayley, U. S. G. S. B. 150, p. 286, 1898.	Gabbro.	In W. T., p. 247.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. BANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
8	56.74	18.80	0.15	6.91	5.57	7.34	2.32	0.77	1.09			0.20	0.07		99.96	2.876
A2. II	.946	.184	.001	.096	.139	.131	.037	.008				.001	.001			27°
9	61.58	15.89	2.19	5.50	2.69	6.49	3.04	0.51	1.26	0.16	0.63	0.12	0.20	CO ₂ none FeS ₂ 0.06 NiO trace BaO 0.06 SrO trace Li ₂ O trace	100.38	
A1. I	1.026	.156	.014	.076	.067	.116	.049	.006			.008	.001	.003			
10	57.25	18.25	1.44	4.73	4.57	8.12	2.85	0.99	0.65	0.31	0.42	0.18	0.11	ZrO ₂ 0.01 S none BaO 0.05 SrO 0.08	100.01	
A1. I	.954	.179	.009	.065	.114	.145	.046	.011			.005	.001	.002			
11	57.04	19.11	4.37	2.48	3.94	7.34	3.48	1.16	1.09		0.47	0.08	0.12	BaO trace SrO 0.02 Li ₂ O trace	100.70	
A2. II	.951	.187	.027	.035	.099	.131	.056	.013			.006	—	.002			
12	56.51	18.10	4.26	2.68	4.52	8.15	3.23	1.15	0.69		0.48	0.14	0.11	Cr ₂ O ₃ trace BaO 0.04 SrO 0.04 Li ₂ O trace	100.10	
A1. I	.942	.177	.027	.038	.113	.145	.051	.013			.006	.001	.002			
13	53.19	17.12	4.35	5.16	3.98	9.39	2.79	0.28	1.21	0.17	1.34	0.13	trace	FeS ₂ 0.94 BaO trace	100.05	
A2. II	.887	.168	.027	.072	.100	.168	.045	.003			.016	.001	—			
14	63.77	19.13	1.66	1.15	4.29	5.63	2.20	0.99	0.60		0.17	0.02	0.20	CO ₂ 0.14 FeS ₂ trace CuS trace	99.95	
A2. II	1.063	.187	.010	.017	.107	.101	.035	.011			.002	—	.003			
15	62.90	18.20	1.28	4.30	2.52	6.76	3.18	1.32	0.15		0.33	0.14			101.08	
B2. III	1.048	.178	.008	.060	.063	.121	.052	.014			.004	.001				
16	62.55	18.75	2.40	3.52	2.84	6.52	3.07	1.07	n. d.		0.19	trace			100.91	
B3. IV	1.043	.184	.015	.049	.071	.116	.050	.012			.002	—				
17	61.90	18.81	1.82	4.30	2.42	6.92	3.17	1.07	0.10		0.35	0.15			101.00	
B2. III	1.032	.184	.011	.060	.061	.123	.051	.011			.004	.001				
18	61.88	18.30	1.97	4.32	2.71	6.32	3.17	1.09	0.19		0.31	0.09			100.35	
A2. II	1.031	.179	.012	.060	.068	.113	.051	.012			.004	—				
19	61.65	18.64	2.20	4.35	3.08	6.08	3.05	1.08	0.12		0.25	0.06			100.57	
A2. II	1.028	.183	.014	.061	.077	.109	.049	.012			.003	—			(100.56)	
20	61.45	18.71	2.30	4.23	2.45	6.07	3.06	1.06	0.50		0.32	trace			100.15	
A3. III	1.024	.183	.014	.058	.061	.108	.049	.011			.004	—				
21	61.45	18.61	2.02	4.95	2.58	6.60	3.30	1.05	0.12		0.32	0.09			100.15	
A2. II	1.024	.182	.013	.069	.065	.118	.053	.011			.004	—				
22	61.25	18.90	2.12	3.69	2.87	6.78	2.74	1.18	0.87		0.19				100.59	
A3. III	1.021	.185	.013	.051	.072	.121	.044	.013			.002					

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4-5. PRESODIC. BANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
8	II.4''4.4''.	Q 11.16 hy 26.44 or 4.45 mt 0.23 ab 19.39 ap 0.30 an 35.58 C 1.12	Mount Morrison, Denver, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 148, p. 159, 1897.	Enstatite diabase porphyry.	In W. T., p. 249.
9	II.4.(3)4.(4)5.	Q 21.48 di 2.75 or 3.34 hy 12.86 ab 25.68 mt 3.25 an 28.08 il 1.22 ap 0.34	Karluk, Kadiak Island, Alaska.	W. F. Hille- brand.	G. F. Becker, U. S. G. S. A. R. 18, III, p. 42, 1898.	Diorite.	In W. T., p. 249.
10	II.4(5)''4.4.	Q 10.86 di 4.51 or 6.12 hy 16.20 ab 24.10 mt 2.09 an 33.92 il 0.76 ap 0.34	Lake Tartarus, n. Lassen Peak, California.	W. C. Wheeler.	J. S. Diller, U. S. G. S. rec. lab.	Basalt.	
11	II.4(5).(3)4.4.	Q 11.10 di 2.81 or 7.23 hy 9.13 ab 29.34 mt 6.26 an 32.80 il 0.91	Suppans Mountain, Tehama County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 196, 1897.	Andesite.	Inclusion in No. 84, II.4.3.4. In W. T., p. 249.
12	II.4(5).(3)4.4.	Q 10.98 di 6.32 or 7.23 hy 9.26 ab 26.72 mt 6.26 an 31.41 il 0.91 ap 0.34	Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 79, p. 29, 1891.	Quartz basalt.	In W. T., p. 249.
13	II.4''4.5.	Q 11.10 di 10.04 or 1.67 hy 9.01 ab 23.98 mt 6.26 an 33.36 il 2.43 ap 0.34	Grass Valley, Nevada County, California.	H. N. Stokes.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 71, 1896.	Diabase.	In W. T., p. 249.
14	(I)II.(3)4''4.4.	Q 28.20 hy 11.76 or 6.12 mt 2.32 ab 18.34 il 0.30 an 28.08 C 4.18	Essequibo River (average sample), British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess., etc., Rivers, p. 34, 1900.	Granitite gneiss.	Also in Goldf. Br. Gui., p. 40, 1908. In W. T., p. 193.
15	''II.4.(3)4.4.	Q 18.66 di 1.40 or 7.78 hy 11.94 ab 27.25 mt 1.86 an 31.14 il 0.61 ap 0.34	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 527, 1904.	Andesite.	Eruption of January, 1904.
16	(I)II.4.(3)4.4.	Q 20.16 hy 11.32 or 6.67 mt 3.48 ab 26.20 il 0.30 an 32.25 C 0.61	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 527, 1904.	Andesite.	Lapilli of Aug. 30, 1902.
17	(I)II.4.(3)4.4''.	Q 18.96 hy 12.04 or 6.12 mt 2.55 ab 26.72 il 0.61 an 33.08 ap 0.34 C 0.20	Le Précheur, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesite.	
18	''II.4.(3)4.4.	Q 18.90 hy 12.61 or 6.67 mt 2.78 ab 26.72 il 0.61 an 31.41 C 0.31	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 527, 1904.	Andesite.	Mean of 8 analyses, 1902-1904.
19	''II.4.(3)4.4.	Q 19.38 hy 13.51 or 6.67 mt 3.25 ab 25.68 il 0.46 an 30.30 C 1.33	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 527, 1904.	Andesite obsidian.	May, 1902.
20	(I)II.4.(3)4.4.	Q 22.02 hy 11.38 or 6.12 mt 3.25 ab 25.68 il 0.61 an 30.02 C 1.53	Rivière Claire, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesite.	Old bomb.
21	''II.4.(3)4.4''.	Q 17.22 hy 13.36 or 6.12 mt 3.02 ab 27.77 il 0.61 an 32.80	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 527, 1904.	Andesite.	Scoria of Jan. 25, 1903.
22	(I)II.4''4.4.	Q 19.74 hy 11.95 or 7.23 mt 3.02 ab 23.06 il 0.30 an 33.64 C 0.71	Colson, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Dacite.	

CLASS II. DOSALANE—Continued.

RANG 4. DOALCIC. BANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
23	61.25	18.50	1.72	4.32	2.87	6.35	3.38	0.96	0.20		0.48	0.12			100.15		
A2. II	1.021	.181	.011	.060	.072	.114	.055	.010			.006	.001					
24	61.20	19.61	2.35	4.20	3.04	6.01	3.22	0.76	n. d.		0.46	0.06			100.91		
B2. III	1.020	.192	.015	.058	.076	.107	.052	.008			.006	—					
25	60.60	18.63	1.77	5.10	2.76	6.52	2.80	0.97	0.25		0.56	0.09			100.05		
A2. II	1.010	.183	.011	.071	.069	.116	.045	.010			.007	—					
26	60.25	19.05	1.35	4.72	3.34	6.85	3.40	0.98	0.62		0.37				100.93		
B3. IV	1.004	.187	.009	.065	.084	.122	.055	.010			.005						
27	60.25	18.30	2.78	3.61	2.73	6.75	2.98	1.09	0.68		0.48	0.09			100.04		
A2. II	1.004	.179	.018	.050	.068	.121	.048	.012			.006	—					
28	60.01	17.54	2.88	4.30	2.76	6.80	3.41	0.89	0.30	0.10	0.45	0.15	0.18	CO ₂ Cl S NaO BaO SrO Li ₂ O	none none trace none 0.03 none trace	99.85	
A1. I	1.000	.172	.018	.060	.069	.121	.055	.009			.006	.001	.003				
29	59.95	19.40	2.25	4.59	2.84	6.75	3.10	0.78	0.62		0.23	0.09			100.60		
A2. II	.999	.190	.014	.064	.071	.121	.050	.008			.003	—					
30	59.90	17.40	3.54	4.50	2.25	6.70	3.35	0.54	0.50		0.55	0.11	trace	SO ₃ Cl SrO	0.48 0.10 trace	100.23	
A2. II	.998	.171	.022	.063	.056	.120	.054	.006			.007	.001					
31	58.30	19.43	4.40	3.33	2.64	7.46	3.07	0.88	0.37		0.49	0.22			100.57		
A2. II	.973	.190	.028	.046	.066	.133	.050	.009			.006	.002					
32	58.20	19.60	3.12	3.42	4.06	6.97	2.77	1.12	1.04		0.52	trace			100.82		
A3. III	.970	.192	.019	.047	.102	.124	.045	.012			.007	—					
33	58.10	19.06	3.37	4.20	3.37	7.84	2.33	1.37	0.87		0.64				101.15		
B3. IV	.968	.187	.021	.058	.084	.140	.037	.015			.008						
34	57.15	20.50	2.70	5.10	3.42	7.75	1.98	0.91	n. d.		0.46	0.09			100.06		
A2. II	.973	.201	.017	.071	.085	.139	.032	.010			.006	—					
35	56.10	20.42	1.90	6.15	4.16	7.50	2.49	1.02	0.37		0.43	0.07			100.61		
A2. II	.935	.200	.012	.086	.104	.134	.040	.011			.005	—					
36	55.42	21.35	3.37	4.87	3.87	7.51	2.94	0.68	0.37		0.33	trace			100.71		
A3. III	.924	.209	.021	.068	.097	.134	.047	.007			.004	—					
37	54.10	20.41	4.02	4.90	4.45	8.95	2.48	0.62	0.18		0.75	trace			100.86		
A3. III	.902	.200	.025	.088	.111	.160	.040	.007			.009	—					
38	53.21	18.81	5.15	6.45	4.54	5.85	2.46	1.08	0.50		1.69	trace			99.54		
A3. III	.887	.184	.032	.090	.114	.105	.040	.012			.021	—					

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4-5. PRESODIC. BANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
23	"II.4.(3)4.4".	Q 17.40 hy 13.40 or 5.56 mt 2.55 ab 23.82 il 0.91 an 30.86 ap 0.34 C 0.51	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 527, 1904.	Andesite.	Dec. 16, 1902.
24	"II.4.(3)4.4(5).	Q 19.98 hy 12.48 or 4.45 mt 3.48 ab 27.25 il 0.91 an 29.75 C 2.55	Morne La Croix, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesite.	
25	"II.4."4.4".	Q 19.56 hy 13.90 or 5.56 mt 2.55 ab 23.58 il 1.06 an 32.25 C 1.22	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 527, 1904.	Andesite.	Scoria of Jan. 25, 1903.
26	"II.4".(3)4.4".	Q 14.10 hy 15.13 or 5.56 mt 2.09 ab 28.82 il 0.76 an 33.92	Rivière Blanche, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesite.	
27	"II.4."4.4.	Q 18.60 di 0.43 or 6.67 hy 10.03 ab 25.15 mt 4.18 an 33.08 il 0.91	Eruption of Aug. 30, 1902, Mont Pelée, Martinique.	Pisani.	A. Lacroix, Mont Pelée, p. 531, 1904.	Andesite ash.	
28	II.4.(3)4.4(5).	Q 16.98 di 2.51 or 5.00 hy 10.82 ab 28.82 mt 4.18 an 29.75 il 0.91 ap 0.34	Mont Pelée, Martinique, West Indies.	W. F. Hille- brand.	J. S. Diller, Nat. Geog. Mag., XIII, p. 291, 1902.	Andesite ash.	May 8, 1902, coll. on S. S. Roddam.
29	"II.4."4.4(5).	Q 17.46 hy 13.30 or 4.45 mt 3.25 ab 26.20 il 0.46 an 33.64 C 1.12	Eruption of Aug. 30, 1902, Mont Pelée, Martinique.	Pisani.	A. Lacroix, Mont Pelée, p. 531, 1904.	Andesite ash.	
30	"II.4.(3)4.(4)5.	Q 19.20 di 1.36 or 3.34 hy 9.42 ab 28.30 mt 5.10 an 30.86 il 1.06 ap 0.34	Coll. June 5, 1902, Mont Pelée, Martinique.	E. Colonna.	E. Colonna, At. Ac. Sc. Torino, XXXVIII, p. 472, 1903.	Andesite ash.	
31	(I)II.4."4.4".	Q 17.34 hy 8.18 or 5.00 mt 6.50 ab 26.50 il 0.91 an 35.03 ap 0.67 C 0.51	Carbet, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesilab- radorite.	
32	"II.4."4.4.	Q 15.42 hy 12.97 or 6.67 mt 4.41 ab 23.53 il 1.06 an 34.47 C 1.12	Fonds Saint-Denis, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesilab- radorite.	
33	"II.4.4.4.	Q 16.08 di 0.64 or 8.34 hy 11.66 ab 19.39 mt 4.87 an 37.53 il 1.22	Morne Diamant, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesilab- radorite.	
34	II.4.4.4.⊙	Q 17.40 hy 14.84 or 5.56 mt 3.94 ab 16.77 il 0.91 an 38.64 C 1.94	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 543, 1904.	Diabase.	Inclusion in andesite.
35	II.4(5).4.4.	Q 11.28 hy 19.51 or 6.12 mt 2.78 ab 20.96 il 0.76 an 37.25 C 1.43	Chateaubriand, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesilab- radorite.	
36	II.4(5).4.4(5).	Q 11.52 hy 15.38 or 3.89 mt 4.87 ab 24.63 il 0.61 an 37.25 C 2.14	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 543, 1904.	Diabase.	Inclusion in andesite.
37	II.4(5).4.4(5).	Q 9.72 di 1.57 or 3.89 hy 14.82 ab 20.96 mt 5.80 an 42.53 il 1.44	Mont Pelée, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 543, 1904.	Diorite.	Inclusion in andesite.
38	II.4"."4.4.	Q 12.84 hy 16.28 or 6.67 mt 7.42 ab 20.96 il 3.19 an 29.19 C 2.75	Route de Lamentin, Martinique, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Labradorite (basalt).	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. BANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
39	58.48	18.90	4.03	4.00	3.10	6.70	2.84	1.13	0.62		0.58	0.05			100.03	
A2. II	.975	.185	.025	.056	.078	.120	.046	.012			.007	—				
40	57.62	19.46	3.43	3.90	1.82	6.25	3.79	0.71	0.59	0.41	0.87	0.17	0.08	SO ₃ none S 0.11 Sol. in H ₂ O CaO 0.20 Na ₂ O 0.08 SO ₃ 0.29	100.08	
A2. II	.960	.191	.021	.054	.046	.112	.061	.008			.011	.001	.001			
41	55.75	19.20	3.20	4.77	4.48	7.47	2.18	0.86	0.87		0.77	0.07			99.62	
A2. II	.929	.188	.020	.067	.112	.134	.035	.009			.010	—				
42	55.08	18.00	2.46	4.57	3.34	7.74	3.45	0.65	1.39	0.66	0.80	0.17	0.21	CO ₂ none SO ₃ 0.24 Cl none FeS 0.91 NiO none BaO trace SrO none	99.67	
A1. I	.918	.176	.016	.064	.084	.138	.056	.007			.010	.001	.003			
43	55.64	18.21	3.63	4.83	3.48	8.14	3.55	0.58	0.54	0.20	0.98	0.11	0.19	CO ₂ none SO ₃ none S none NiO 0.04 BaO none SrO 0.03	100.15	
A1. I	.927	.178	.023	.067	.087	.145	.057	.006			.012	.001	.003			
44	57.10	18.50	2.66	4.08	4.62	7.74	2.91	1.60	1.05		0.51	trace			100.17	
A3. III	.952	.181	.017	.057	.116	.138	.047	.011			.006	—				
45	53.85	17.15	4.08	6.95	5.29	8.99	3.01	0.24	0.58						100.14	
A3. III	.898	.168	.026	.097	.132	.161	.048	.003								
46	59.25	16.75	4.00	4.82	3.81	6.88	2.56	1.92	n. d.					CO ₂ trace	99.99	
A3. III	.988	.164	.025	.067	.095	.123	.041	.020								
47	58.30	15.39	4.76	4.50	2.68	10.96	1.74	0.94	n. d.		0.75				100.02	2.842
A3. III	.972	.151	.030	.062	.067	.196	.028	.010			.009					
48	54.30	17.21	0.05	9.27	5.78	7.45	2.10	0.49	1.50		1.42	0.07			99.64	
A2. II	.905	.169	—	.129	.145	.133	.034	.005			.018	—				
49	60.50	20.40	1.49	2.93	2.91	6.20	3.48	1.32	0.50						99.77	
A3. III	1.008	.200	.009	.040	.073	.110	.050	.013								
50	58.6	19.2	0.6	4.3	3.8	6.9	2.4	1.5	2.8						100.1	
B3. IV	.977	.188	.004	.060	.095	.123	.039	.016								
51	62.21	15.60	5.26	1.36	2.61	6.55	2.50	1.63	2.25						99.97	
A3. III	1.035	.153	.033	.019	.065	.117	.040	.017								
52	54.28	19.41	7.14	2.68	2.63	6.83	3.02	2.05	0.64		1.24		0.41		100.33	
A2. II	.905	.190	.045	.038	.066	.121	.048	.022			.016		.006			
53	49.57	18.91	4.58	4.71	6.01	10.30	1.91	0.26	0.46	none	1.17	0.80		CO ₂ 0.25 SO ₃ 0.77	99.70	
A2. II	.826	.185	.029	.065	.150	.184	.031	.003			.015	.006				

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4-5. PRESODIC. BANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
39	"II.4."4.4.	Q 17.10 hy 10.97 or 6.67 mt 5.80 ab 24.10 il 1.06 an 33.36 C 0.71	Riviere Noire, Guadeloupe, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 588, 1904.	Andesilab- radorite.	
40	(I)II.4.(3)4.(4)5.	Q 15.54 hy 7.64 or 4.45 mt 4.87 ab 31.96 il 1.67 an 30.30 ap 0.34 C 1.22	La Soufrière, St. Vincent, West Indies.	G. Steiger.	Diller and Steiger, Science, XV, p. 948, 1902.	Andesite ash.	Coll. May 7, 1902; lat. 11° 21' N., long. 57° 47' W.
41	II.4.4.4.⊙	Q 14.88 hy 16.08 or 5.00 mt 4.64 ab 18.31 il 1.52 an 37.25 C 1.02	La Soufrière, Guadeloupe, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 588, 1904.	Labradorite.	
42	II.4(5).(3)4.(4)5.	Q 10.02 di 4.97 or 3.89 hy 11.39 ab 29.34 mt 3.71 an 31.41 il 1.52 ap 0.34	Eruption of 1902, La Soufrière, St. Vincent, West Indies.	W. F. Hille- brand.	E. O. Hovey, A. J. S., XIV, p. 327, 1902.	Andesite ash.	
43	II.4(5).(3)4.(4)5.	Q 10.20 di 6.09 or 3.34 hy 10.36 ab 29.87 mt 5.34 an 31.97 il 1.82 ap 0.34	La Soufrière, St. Vincent, West Indies.	G. Steiger.	J. S. Diller, Nat. Geog. Mag., XIII, p. 291, 1902.	Andesite pumice.	
44	II.4(5).4.4.	Q 10.98 di 1.11 or 6.12 hy 15.56 ab 24.63 mt 3.94 an 36.97 il 0.91	Saba Island, West Indies.	A. Pisani.	A. Lacroix, Mont Pelée, p. 579, 1904.	Andesilab- radorite.	
45	II".4(5).4.5.	Q 6.66 di 9.98 or 1.67 hy 17.09 ab 25.15 mt 6.03 an 32.53	Ginger Island, West Indies.	P. T. Cleve.	P. T. Cleve, Sv. Vet. Ak. Hand., IX, No. 12, p. 36, 1871.	Diorite.	Cf. A. G. Hög- bom, B. G. Inst. Ups., VI, p. 230 (1903), 1905.
46	II.4.(3)4."4.	Q 15.54 di 4.51 or 11.12 hy 12.85 ab 21.48 mt 5.80 an 28.63	Great Ayton, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 224, 1884.	Andesite.	In W. T., p. 249.
47	II.4.4.4.⊙	Q 20.70 di 18.60 or 5.56 hy 0.76 ab 14.67 mt 6.96 an 31.41 il 1.37	Castle Rock, Tynemouth, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 235, 1884.	Andesite.	Al ₂ O ₃ corr. for TiO ₂ ; cf. Q. J. G. S., LXVI, p. 3, 1910. In W. T., p. 249.
48	II".4(5).4.4(5).	Q 9.12 di 0.68 or 2.75 hy 28.82 ab 17.82 il 2.74 an 36.14	Pont en X, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 105, 1913.	Gabbro- norite.	
49	(I)II.4.(3)4.4.	Q 18.36 hy 11.39 or 7.23 mt 2.09 ab 26.20 an 30.59 C 2.75	Vallée de Bar- boulère, Pyrenees, France.	Pisani.	A. Lacroix, B. Serv. Ct. G. Fr., XI, No. 71, p. 31, 1900.	Granite.	In W. T., p. 249.
50	"II.4.4.4.	Q 15.00 hy 16.89 or 8.90 mt 0.93 ab 20.44 an 34.19 C 1.02	Pic du Midi d'Ossan, Pyrenees, France.	Not stated.	J. de Lapparent, B. Soc. Min. Fr., XXXIV, p. 291, 1911.	Quartz mi- crocliorite.	
51	"II.4.(3)4.4.	Q 24.90 di 4.54 or 9.45 hy 4.40 ab 20.96 mt 4.41 an 26.69 hm 2.24	San Pedro, Cabo de Gata, Spain.	Kottenhain.	A. Osann, Z. D. G. G., XLIII, p. 702, 1891.	Dacite.	In W. T., p. 249.
52	"II.4(5).(3)4."4.	Q 10.68 di 0.22 or 12.23 hy 6.50 ab 25.15 mt 6.73 an 33.36 il 2.43 hm 2.58	Källhult, Hvetlanda, Smaland, Sweden.	H. Santesson.	P. J. Holmquist, B. Un. Ups., VIII, p. 264, 1906.	Granite.	
53	II".4"4.4(5).	Q 11.16 di 5.07 or 1.67 hy 15.38 ab 16.24 mt 6.73 an 39.20 il 2.28 ap 2.02	Burg Frankenstein, Odenwald, Germany.	G. Butzbach.	G. Klemm, Nbl. Ver. Erdk. Darm. (4), XXVII, p. 12, 1906.	Gabbro.	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. BANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
54	60.80	17.24	3.95	2.97	2.83	5.34	2.69	0.95	0.90	0.22	1.12	0.78		CO ₂ 0.05 SO ₃ 0.10	99.94	
A2. II	1.013	.169	.025	.042	.071	.095	.044	.010			.014	.005				
55	54.73	18.64	5.47	8.24	2.01	6.22	2.17	0.74	0.21		1.43	0.36			100.22	
A2. II	.912	.183	.034	.114	.050	.111	.035	.008			.018	.003				
56	50.28	16.46	6.66	6.08	4.62	7.89	2.10	1.03	1.17	0.04	1.81	0.75		CO ₂ 0.13 SO ₃ 0.83	99.85	
A2. II	.838	.161	.042	.085	.116	.141	.034	.011			.023	.005				
57	56.31	20.83	4.13	1.87	4.91	7.54	1.85	1.07	1.23						99.74	
A3. III	.939	.204	.025	.026	.123	.134	.030	.012								
58	62.53	17.18	2.38	0.77	1.79	8.61	3.40	0.40	1.82		0.37	0.14		SrO 0.03	99.42	
A2. II	1.042	.168	.015	.011	.045	.154	.055	.004			.005	.001				
59	54.39	17.85	6.53	4.71	3.93	6.37	2.99	1.05	2.59						100.46	
A3. III	.907	.175	.041	.065	.100	.114	.048	.011								
60	53.14	17.82	8.69	1.93	4.53	7.26	1.51	1.18	3.26						99.42	
A3. III	.886	.174	.054	.028	.115	.129	.024	.013							(99.52)	
61	56.02	18.08	2.49	6.63	3.92	7.50	1.91	1.09	2.14				trace		99.68	2.829
A3. III	.934	.177	.016	.092	.098	.134	.031	.012					—			
62	56.60	16.80	2.52	5.12	3.80	7.29	2.43	1.98	1.80	0.58	0.99	0.12	0.13		100.16	
A2. II	.943	.165	.016	.071	.095	.130	.039	.021			.012	.001	.002			
63	56.38	17.48	5.30	2.72	3.10	10.89	1.77	1.38	0.52		0.33				99.87	2.468
A3. III	.935	.171	.033	.038	.077	.194	.029	.015			.004					
64	55.83	18.96	5.64	3.23	2.76	7.40	3.12	1.17	1.20		0.32			Cl trace	99.63	2.647
A3. III	.931	.186	.035	.045	.068	.132	.050	.013			.004					
65	59.63	16.18	7.34	2.66	1.91	8.63	1.80	1.23	n. d.			0.13	trace	S trace	99.51	2.880
A3. III	.994	.159	.046	.037	.043	.154	.029	.013				.001	—			
66	54.52	16.20	5.70	3.09	5.82	8.18	2.16	0.98	0.34	0.18	1.98	0.59		FeS ₂ 0.23	99.97	2.86
A2. II	.909	.159	.036	.043	.146	.146	.035	.010			.025	—				
67	53.69	17.94	7.57	2.56	3.40	11.68	1.36	0.86	0.49			0.07	0.39	SO ₃ 0.22	100.23	
A3. III	.895	.176	.048	.036	.085	.209	.022	.009				—	.006			
68	49.25	16.31	6.47	3.13	6.16	10.58	2.22	0.05	3.14		2.03	0.10	trace	S none	99.48	
A2. II	.821	.160	.040	.043	.154	.189	.035	—			.025	.001	—			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4-5. PRESODIC. BANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
54	"II.(3)4."4.4".	Q 27.54 hy 7.50 or 5.56 mt 5.80 ab 23.06 il 2.13 an 21.68 ap 1.34 C 3.77	Eberstadt, Bl. Rossdorf, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 43, 1912.	Biotite granite.	
55	II.4.4.4.⊙	Q 21.00 hy13.88 or 4.45 mt 7.89 ab 18.34 il 2.74 an 28.08 ap 1.00 C 3.98	Buschhorn, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 6.	Basalt glass.	
56	II(III).4"4.4.	Q 11.52 di 1.76 or 6.12 hy13.41 ab 17.82 mt 9.74 an 32.25 il 3.50 ap 1.68	Ober Ramstadt, Bl. Rossdorf, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 29, 1912.	Gabbro.	
57	"II.4.4.4.	Q 17.70 hy12.43 or 6.67 mt 5.80 ab 15.72 an 37.25 C 2.86	Arnsdorf, Riesengebirge, Silesia.	W. Herz.	L. Milch, N. J. B. B., XII, p. 213, 1899.	Lampro- phyre.	In W. T., p. 249.
58	(I)II.4.(3)4."5.	Q 23.22 di 9.07 or 2.22 hy 0.30 ab 28.82 mt 1.39 an 30.30 il 0.76 hm 1.44 ap 0.34	Ujmolodava, Kraso-Szoreny, Hungary.	K. Emszt.	Rozlozsnit and Emszt, Mt. Ung. G. A., XVI, p. 198, 1908.	Quartz diorite porphyrite.	
59	II.4""4.4".	Q 12.06 hy13.17 or 6.12 mt 9.51 ab 25.15 an 31.69 C 0.20	Lupsa Valley, Persanyer Mountains, Hungary.	Herbich.	J. Budai, F. K., XVI, p. 267, 1886.	Diabase.	In W. T., p. 249.
60	II.4.4."4.	Q 17.46 hy11.50 or 7.22 mt 6.50 ab 12.58 hm 4.16 an 35.86 C 0.82	Szekelykö, Siebenburgen, Hungary.	J. v. Szadeczký.	J. v. Szadeczký, F. K., XXII, p. 324, 1892.	Labradorite porphyry.	In W. T., p. 249.
61	II.4.4.4.⊙	Q 14.28 hy19.83 or 6.67 mt 3.71 ab 16.24 an 37.25	Raffiner Tobel, n. Lana, Ulten Massif, Tyrol.	F. Erben.	F. Becke, Ds. Ak. W. Wien, LXXV, (1), p. 160, 1913.	Tonalite.	
62	II.4""(3)4.(3)4.	Q 12.66 di 4.97 or 11.68 hy13.02 ab 20.44 mt 3.71 an 29.19 il 1.82 ap 0.34	Monte Pischinale, n. Bosa, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVI, p. 587, 1913.	Andesite.	Not described.
63	II.4.4."4.	Q 16.32 di 14.50 or 8.34 hy 1.10 ab 15.20 mt 7.66 an 35.31 il 0.61	Kaimeni, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende andesite.	Segregation in No. 191, II.4.3.4. In W. T., p. 249.
64	"II.4""4.4.	Q 13.44 di 1.97 or 7.23 hy 6.66 ab 26.20 mt 8.12 an 34.19 il 0.61	Kosona, Methana, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende andesite.	Segregation in No. 190, II.4.3.4.
65	II."4.4.4.	Q 25.32 di 7.34 or 7.23 hy 1.80 ab 15.20 mt 8.58 an 32.53 hm 1.44 ap 0.34	Zonderwater, Transvaal.	H. Eckstein & Co.	C. B. Horwood, Tr. G. Soc. S. Af., XIII, p. 51, 1911.	Granophyre.	
66	II.4.4.4.⊙	Q 13.98 di 6.91 or 5.56 hy11.40 ab 18.34 mt 4.18 an 31.69 il 3.80 hm 2.88 ap 0.59	Zeia River, Amur District, Siberia.	Not stated.	E. Ahnert, Reg. Aurif. Sib., X, Tab. VII, 1910.	Augite porphyrite.	"P ₂ O ₅ " is Ca ₃ P ₂ O ₈ .
67	II.4.4""4.	Q 16.20 di 13.82 or 5.00 hy 2.10 ab 11.53 mt 9.74 an 40.31 hm 0.96	Werkh Issetsk, Mursinsk, Ural Mountains.	G. Katerfeld.	W. Nikitin, Mem. C. G. Rus., XXII, p. 86, 1907.	Diorite.	
68	II(III).4(5).4.5.	Q 8.76 di 13.18 or — hy 9.30 ab 18.34 mt 4.18 an 34.75 il 3.80 hm 3.52 ap 0.34	Retschnaia Bay, Copper Island, Commander Islands, Bering Sea.	W. Staronka.	J. Morozewicz, Mem. Com. G. Russ., No. 72, p. 72, 1912.	Basalt.	

CLASS II. DOSALANE—Continued.

RANG 4. DOALCIC. BANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
69	57.32	19.79	5.33	1.52	3.48	6.82	3.51	1.26	0.56				trace		99.59	2.71
A3. III	.955	.194	.033	.021	.087	.121	.057	.015								
70	60.93	16.46	3.35	5.94	2.88	7.84	1.44	0.79	n. d.		0.42	0.13	0.55		100.78	
A2. II	1.016	.161	.021	.082	.072	.140	.023	.009			.005	.001	.008			
71	59.66	15.51	3.76	5.40	3.67	6.56	2.50	1.08	n. d.			0.18	1.40		100.31	
A72. II	.994	.152	.024	.075	.092	.117	.040	.011				.001	.020			
72	59.47	17.12	2.33	5.69	4.04	7.24	2.23	0.30	1.35						99.77	
A3. III	.991	.168	.014	.079	.101	.128	.035	.003								
73	56.08	18.12	2.46	6.97	3.13	7.14	2.02	1.50	0.15		1.31		0.34		99.22	
B2. III	.935	.178	.015	.097	.078	.128	.032	.016			.016		.005			
74	53.17	18.94	4.65	3.36	2.99	7.89	3.25	0.69	3.71		1.25	trace	0.18		100.08	
A2. II	.886	.186	.029	.047	.075	.141	.053	.007			.016	—	.003			
75	51.40	17.42	1.74	10.26	4.36	10.51	1.44	0.22	0.49		1.44	0.15	0.03		99.46	
A2. II	.857	.171	.011	.143	.109	.188	.023	.002			.018	.001	—			
76	49.77	20.57	6.06	5.11	5.00	10.37	1.08	0.84	0.73			0.16	0.20		99.89	2.642
A2. II	.830	.201	.038	.071	.125	.186	.018	.009				.001	.003			
77	57.09	19.42	5.50	3.19	4.11	6.00	2.74	0.58	0.91				0.16		99.70	2.852
A3. III	.952	.190	.034	.044	.103	.107	.044	.006					.002			
78	55.18	18.02	3.29	4.94	3.81	7.51	2.60	1.89	1.09	0.58	0.96	trace		CO ₂ 0.10 S trace	99.97	
A3. III	.920	.176	.021	.068	.095	.134	.042	.020			.012	—				
79	53.94	18.93	4.06	5.08	3.23	7.85	2.56	1.68	0.92	0.42	1.06	trace			99.73	
A3. III	.899	.186	.026	.071	.081	.140	.041	.018			.013	—				
80	55.52	17.42	5.14	5.35	3.30	8.12	2.47	0.77	0.36	0.34	0.63	0.15	0.05	SO ₃ 0.13	99.80	2.80
A2. II	.926	.171	.032	.075	.083	.145	.040	.008			.008	.001	—			
81	54.49	16.89	4.88	5.44	3.35	8.49	2.39	0.94	0.87	0.12	1.25	0.28	0.04		99.67	2.81
A2. II	.908	.166	.031	.075	.084	.152	.039	.010			.016	.002	—			
82	63.65	16.54	0.95	4.69	2.43	6.49	2.61	0.29	1.23	0.45	0.36	trace	0.28	ZrO ₂ none Cl 0.11 F 0.05 S 0.08 Cr ₂ O ₃ none BaO 0.05 SrO 0.05	100.31	
A1. I	1.061	.162	.006	.065	.061	.116	.042	.003			.005	—	.004			
83	51.74	15.86	4.39	4.39	5.73	10.07	1.54	0.64	2.60	2.05	0.73	trace	0.26	ZrO ₂ none Cl 0.10 F 0.03 S 0.11 Cr ₂ O ₃ none BaO 0.02 SrO 0.02	100.28	
A1. I	.862	.155	.028	.061	.143	.180	.025	.007			.009	—	.004			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4-5. PRESODIC. BANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
69	''II.4(5).(3)4.4.	Q 11.64 hy 8.70 or 8.34 mt 4.87 ab 29.87 hm 1.92 an 33.64	Korjaka Volcano, Kamchatka.	Not stated.	K. Bogdanovitsch, Pet. Mitth., L, p. 172, 1904.	Augite andesite.	
70	II.''4.4.4.	Q 25.32 di 1.86 or 5.00 hy 14.72 ab 12.05 mt 4.87 an 35.86 il 0.76 ap 0.34	Tarumai Volcano, Hokkaido, Japan.	N. Yoshioka.	S. Kozu, J. G., XIX, p. 636, 1911.	Pyroxene andesite.	Eruption of 1909.
71	II.4.''4.4.	Q 18.60 di 2.97 or 6.11 hy 17.11 ab 20.96 mt 5.57 an 28.08 ap 0.34	Obandai, Bandai San, Japan.	Shimidzu.	T. Wada, Mt. D. Ges. Ostas., V, p. 74, 1889.	Augite andesite.	MnO high? Alkalies corr. Cf. N. J., 1890, II, p. 102. In W. T., p. 251.
72	II.4.4.''5.	Q 20.46 hy 18.68 or 1.67 mt 3.25 ab 18.34 an 35.58 C 0.20	Bandai San, Japan.	Nishiyama.	Nishiyama, Ref. N. J., 1890, II, p. 102.	Andesite.	In W. T., p. 251.
73	II.4.4.''4.	Q 14.52 hy 17.17 or 8.90 mt 3.48 ab 16.77 il 2.43 an 35.58 C 0.20	Kasa Yama, n. Hagi, Nagato, Japan.	T. Ono.	S. Kozu, J. G., XIX, p. 564, 1911.	Quartz basalt.	
74	II.4(5)''4.(4)5.	Q 10.74 di 3.27 or 3.89 hy 6.63 ab 27.77 mt 6.73 an 35.03 il 2.43	Ujiki, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sci. Rep. Tohoku Un. (2), I, p. 49, 1913.	Andesite.	
75	II(III).4(5). 4(5).(4)5.	Q 9.00 di 9.74 or 1.12 hy 21.08 ab 12.05 mt 2.55 an 40.59 il 2.74 ap 0.34	Mihara Volcano, Izu Islands, Japan.	Tokayanagi.	S. Kozu, pers. com.	Andesite basalt.	Eruption of December, 1912.
76	II.4(5).4(5).4.	Q 9.12 di 2.00 or 5.00 hy 16.02 ab 9.43 mt 8.82 an 48.37 il 0.34	Crater, Fuji Yama, Japan.	Hida.	T. Wada, Tr. Seism. Soc. Jap., IV, p. 33, 1882.	Anorthite basalt.	Also in Milne and Burton, Volc. of Jap., I, p. 6, 1893. Not in W. T.
77	II.4.''4.(4)5.	Q 19.50 hy 11.62 or 3.34 mt 7.89 ab 23.06 an 29.75 C 3.37	Ahoer, Sumatra.	L. Serrurier.	R. D. M. Verbeck, Sum. Westk., p. 232, 1883.	Quartz diorite.	Not in W. T.
78	II.4(5).(3)4.4''.	Q 10.20 di 4.48 or 11.12 hy 11.96 ab 22.01 mt 4.87 an 31.69 il 1.82	Parsambilan, Tobaland, Sumatra.	M. Ditttrich.	H. Stegmann, N. J. B. B., XXVII, p. 409, 1909.	Andesite.	
79	II.4(5)''4.4.	Q 9.90 di 2.94 or 10.01 hy 10.90 ab 21.48 mt 6.03 an 35.31 il 1.98	Singalang Volcano, Timorland, Sumatra.	M. Ditttrich.	H. Stegmann, N. J. B. B., XXVII, p. 422, 1909.	Andesite.	
80	II.4.4.4''.	Q 15.12 di 4.97 or 4.45 hy 10.50 ab 20.96 mt 7.42 an 34.19 il 1.22 ap 0.34	Kamong Gadjia, Flores Island.	A. Lindner.	G. Rack, N. J. B. B., XXXIV, p. 81, 1912.	Labradorite andesite.	
81	II.4.4.4.⊙	Q 14.40 di 6.27 or 5.56 hy 9.07 ab 20.44 mt 7.19 an 32.53 il 2.43 ap 0.67	Bara Volcano, Flores Island.	A. Lindner.	G. Rack, N. J. B. B., XXXIV, p. 82, 1912.	Labradorite andesite.	
82	''II.''4.4.''5.	Q 26.40 hy 13.76 or 1.57 mt 1.39 ab 22.01 il 0.76 an 32.25 C 0.10	Timor Island.	E. W. Morley.	J. P. Iddings, pers. com.	Not named.	
83	II''4''4.4.	Q 11.76 di 12.17 or 3.89 hy 11.94 ab 13.10 mt 6.50 an 34.75 il 1.37	Timor Island.	E. W. Morley.	J. P. Iddings, pers. com.	Not named.	

CLASS II. DOSALANE—Continued.

RANG 4. DOALCIC. BANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
84	56.60	12.50	6.55	9.30	2.55	9.50	1.45	0.35	0.90		trace	trace		Cr ₂ O ₃ trace	100.00	
A3. III	.943	.122	.041	.129	.064	.170	.024	.004			—	—				
85	61.30	16.31	2.68	4.14	2.65	6.65	2.58	1.70	0.54	0.75	0.60	0.22	0.09		100.21	
A2. II	1.022	.160	.017	.057	.066	.119	.042	.018			.008	.002	.001			
86	59.29	17.71	1.98	3.78	3.21	6.63	2.81	1.54	1.46	0.73	0.93	0.11	0.03		100.21	
A2. II	.988	.174	.012	.053	.080	.118	.045	.016			.012	.001	—			
87	59.20	17.00	3.96	3.13	3.02	6.70	2.63	1.64	1.30	0.33	0.98	0.25	0.08	CO ₂ none	100.22	
A2. II	.987	.164	.025	.043	.076	.120	.042	.017			.012	.002	.001			
88	57.15	19.26	1.36	4.17	3.58	7.13	2.88	1.10	1.41	0.68	0.84	0.10	0.42	CO ₂ none SO ₃ 0.12	100.20	
A2. II	.953	.189	.009	.058	.090	.127	.047	.012			.011	.001	.006			
89	55.85	15.95	4.72	5.67	3.33	6.54	2.94	0.75	3.00		1.15		0.10	BaO none	100.00	
A2. II	.931	.156	.029	.079	.083	.117	.047	.008			.014		.001			
90	52.07	17.25	6.16	5.40	2.92	8.12	3.18	1.09	1.12	0.14	1.23	0.78	0.20	CO ₂ 0.02 SO ₃ 0.20	99.88	
A2. II	.868	.169	.039	.075	.073	.145	.051	.012			.015	.005	.003			
91	51.70	18.04	9.46	4.47	3.32	8.15	2.41	1.22	0.94						99.71	
A3. III	.862	.177	.059	.063	.083	.146	.039	.013								
92	57.00	17.47	4.59	4.43	3.23	8.51	2.98	1.15	0.21			0.19			99.76	
A3. III	.950	.171	.029	.061	.081	.152	.048	.012				.001				
93	58.35	16.91	1.79	5.71	4.34	6.88	2.99	1.33	0.35		0.80				99.45	
A2. II	.973	.166	.011	.079	.109	.123	.048	.014			.010					
94	57.30	17.97	2.17	3.79	2.57	6.72	3.25	0.96	4.26		0.56	0.20			99.75	
A2. II	.955	.176	.014	.053	.064	.120	.053	.010			.007	.001				

RANG 5. PERCALCIC.

1	46.27	19.76	8.91	3.18	6.47	12.02	0.65	0.13	1.76			trace	0.36	SO ₂ 0.08 NiO 0.19 CuO 0.10	99.88	
A2. II	.771	.194	.056	.044	.162	.214	.010	.001				—	.005			

CLASS II. DOSALANE.

RANG 1. PERALKALIC. UMPTEKASE. (C. I. P. W., 1902.)

1	53.70	11.16	3.10	1.21	6.44	3.46	1.67	11.16	2.61	0.80	1.92	1.75	0.04	SO ₂ 0.06 Cl 0.03 F 0.44 Cr ₂ O ₃ 0.04 BaO 0.62 SrO 0.19 Li ₂ O trace	100.40	
A1. I	.893	.109	.019	.017	.161	.062	.027	.119			.024	.012	—			

ORDER 4. QUARDOFELIC. AUSTRARE—Continued.

SUBRANG 4-5. PRESODIC. BANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
84	II(III).''4.4.4(5)	Q 21.54 di 17.83 or 2.22 hy 9.01 ab 12.58 mt 9.51 an 26.13	Tasmania. Locality not given.	Not stated.	G. Cosyns, B. Soc. Belg. G., XXII, p. 258, 1908.	Diabase.	
85	''II.4.(3)4.4.	Q 21.06 di 2.72 or 10.01 hy 9.63 ab 22.01 mt 3.94 an 27.80 il 1.22 ap 0.67	Romunga Creek, Aroha, Hauraki, New Zealand.	Surv. lab.	Henderson and Bartrum, N. Z. G. S. B. 16, p. 75, 1913.	Andesite.	
86	II''4.(3)4.4.	Q 17.22 di 0.43 or 8.90 hy 11.63 ab 23.58 mt 2.78 an 31.41 il 1.82 ap 0.34	Wairakau Creek, Aroha, Hauraki, New Zealand.	Surv. lab.	Henderson and Bartrum, N. Z. G. S. B. 16, p. 75, 1913.	Andesite.	
87	''II.4.(3)4.4.	Q 19.74 di 1.08 or 9.45 hy 8.02 ab 22.01 mt 5.80 an 30.02 il 1.82	Sheehan Creek, Aroha, Hauraki, New Zealand.	Surv. lab.	Henderson and Bartrum, N. Z. G. S. B. 16, p. 62, 1913.	Andesite.	
88	II.4''.'4.4.	Q 13.02 hy 14.81 or 6.67 mt 2.09 ab 24.63 il 1.67 an 34.47 ap 0.34 C 0.61	Thames Mine, Hauraki, Auckland, New Zealand.	J. S. MacLaurin.	C. Fraser, N. Z. G. S. B. 10, p. 24, 1910.	Andesite.	
89	II.4.(3)4.4(5).	Q 15.78 di 3.63 or 4.45 hy 11.42 ab 24.63 mt 6.73 an 28.08 il 2.13	Thames, Hauraki, Auckland, New Zealand.	J. S. MacLaurin.	C. Fraser, N. Z. G. S. B. 10, p. 24, 1910.	Andesite.	
90	II.4(5).(3)4.4.	Q 9.54 di 4.91 or 6.67 hy 8.11 ab 26.72 mt 9.05 an 29.47 il 2.28 ap 1.68	Inangahua, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Diorite.	
91	II.4(5).4.4.	Q 11.52 di 4.57 or 7.23 hy 6.70 ab 20.44 mt 13.69 an 34.75	St. Paul Island, Atlantic Ocean.	R. Reinisch.	R. Reinisch, D. Tiefsee Exp., X, (3), p. 69, 1908.	Basalt.	
92	II.4''.(3)4.4.	Q 13.02 di 8.50 or 6.67 hy 8.24 ab 25.15 mt 6.73 an 30.86 ap 0.34	Farallon de Pajaros, Mariana Islands.	Eyme.	E. Kaiser, Jb. Pr. G. L.-A., XXIV (1903), p. 117, 1907.	Augite andesite.	
93	II.4''.(3)4.4.	Q 12.42 di 4.32 or 7.78 hy 16.43 ab 25.15 mt 2.55 an 28.91 il 1.52	Hovgaard Island, Weddell quad- rant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Quartz- biotite diorite.	
94	II''4.(3)4.4''.	Q 15.06 di 0.92 or 5.56 hy 10.16 ab 27.77 mt 3.25 an 31.41 il 1.06 ap 0.34	Admiralty Bay, S. Shetland Island, Weddell quadrant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Hypersthene andesite.	

SUBRANG. NOT NEEDED.

1	II''4(5).5.0.	Q 8.46 di 5.62 or 0.56 hy 13.60 ab 5.24 mt 11.37 an 52.26 hpn 1.12	Werkh Issetsk, Mursinsky, Ural Mountains, Russia.	G. Katerfeld.	W. Nikitin, Mem. Com. G. Russ., XXII, p. 75, 1907.	Gabbro.	
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ORDER 5. PERFELIC. GERMANARE. (C. I. P. W., 1902.)

SUBRANG 1. PERPOTASSIC.

1	II(III).5.1.1.	or 60.60 ac 8.78 ns 0.98 ks 1.54 di 4.54 hy 4.60 ol 6.58 ap 4.03 p 0.95	Fifteen-mile Spring, Leucite Hills, Wyoming.	W. F. Hille- brand.	W. Cross, A. J. S., IV, p. 130, 1897.	Wyomingite.	In W. T., p. 313.
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CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. UMPTEKASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
1	58.04	17.24	2.49	1.24	1.79	3.50	3.37	10.06	1.95		0.30	0.22	trace	SO ₃ Cl	trace 0.38	100.58	
A2. II	.967	.169	.015	.017	.045	.062	.055	.107			.004	.002	—				
2	54.99	12.98	3.13	3.92	5.50	5.67	2.83	7.08	0.58	0.41	0.99	1.00	0.13	CO ₂ ZrO ₂ S Cr ₂ O ₃ NiO BaO SrO	none 0.04 0.05 0.01 0.04 0.47 0.17	99.99	
A1. I	.917	.127	.019	.054	.138	.101	.045	.076			.012	.007	.002				
3	61.28	14.71	1.21	2.85	1.69	5.61	2.99	7.70	0.43	0.28	0.41	0.16	trace	SO ₃ BaO SrO	0.08 0.72 0.04	100.16	
A1. I	1.021	.144	.007	.040	.042	.100	.048	.082			.005	.001	—				
4	52.52	15.33	8.37	5.36	2.25	1.66	3.28	8.55	0.28		1.71	0.53	0.04	S BaO	0.02 0.11	100.01	
A2. II	.875	.150	.052	.075	.056	.030	.053	.091			.021	.004	—				
5	51.43	14.88	6.30	3.14	6.67	5.01	1.83	9.22	0.74		1.12	0.51				100.85	
A2. II	.857	.146	.039	.043	.167	.089	.030	.098			.014	.004					

RANG 1. PERALKALIC. UMPTEKASE.

1	60.00	15.33	6.02	0.67	0.61	1.12	6.44	8.15	0.32	0.08	0.40		0.63	Cl	0.09	99.86	
A2. II	1.000	.150	.038	.009	.015	.020	.104	.087			.005		.009				
2	59.89	17.70	1.95	2.71	1.56	2.53	5.74	5.83	0.29		0.96	0.17		CO ₂	0.39	99.72	
A2. II	.998	.174	.012	.038	.039	.045	.093	.062			.012	.001					
3	58.81	13.37	3.88	6.97	0.51	3.89	4.96	5.42	0.75	0.29	0.75	0.31	0.20			100.11	2.75
A2. II	.980	.131	.024	.097	.013	.070	.080	.057			.009	.002	.003			(100.06)	17.5°
4	62.99	14.25	2.78	5.15	1.30	2.72	4.86	6.35	0.18		0.16		0.18			100.92	2.732
A2. II	1.050	.140	.017	.072	.033	.049	.078	.068			.002		.003				
5	63.02	14.87	6.53	none	0.95	1.12	5.85	5.62	1.45				0.46			99.87	
A3. III	1.050	.146	.041	—	.024	.020	.095	.060					.007				
6	61.46	14.55	2.30	5.78	0.50	2.74	4.71	4.88	0.74	0.54	1.07	0.27	0.25	ZrO ₂ F S BaO	0.02 0.14 0.01 0.17	100.13	
A1. I	1.024	.143	.014	.081	.013	.049	.076	.052			.013	.002	.004				
7	61.79	16.90	3.10	1.07	0.90	2.44	5.26	6.96	0.29	0.14	0.90	0.34	0.19			100.28	
A2. II	1.030	.166	.019	.015	.023	.044	.085	.074			.011	.002	.003				
8	62.57	16.72	1.32	4.25	0.52	1.76	6.27	6.00	0.37		0.22	0.20	0.07	S BaO	0.13 0.05	100.45	
A1. I	1.043	.164	.008	.059	.013	.031	.102	.064			.003	.001	.001				
9	55.73	15.47	8.16	3.88	0.99	3.56	5.09	4.86	0.95		0.34		0.76			99.79	
A2. II	.929	.152	.051	.054	.025	.064	.082	.052			.004		.011				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 2. DOPOTASSIC. HIGHWOODOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	(I)II.5''.1''.2''.	or 59.49 di 9.29 ab 14.67 ol 0.14 an 3.34 mt 3.02 ne 6.25 il 0.61 hl 0.59 hm 0.32 ap 0.67	Highwood Gap, Highwood Mountains, Montana.	E. B. Hurlbut.	L. V. Pirsson, U. S. G. S. B. 237, p. 128, 1905.	Tinguaite porphyry.	In W. T., p. 251.
2	II''.5.1.2(3).	or 42.26 di 17.24 ab 19.91 ol 8.25 an 1.67 mt 4.41 ne 1.99 il 1.82 ap 2.35	Wildcat Gulch, Uncompaghre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Syenite.	
3	II.5.1(2).2(3).	Q 3.60 di 16.02 or 45.59 wo 1.51 ab 25.15 mt 1.62 an 3.89 il 0.76 ap 0.34	Turnback Creek, Tuolumne County, California.	H. N. Stokes.	H. W. Turner, U. S. G. S. B. 148, p. 217, 1897.	Augite syenite.	In W. T., p. 251.
4	II.5.1.2(3).	or 50.60 di 2.38 ab 21.48 ol 3.35 an 1.67 mt 12.06 ne 3.41 il 3.19 ap 1.34	Wälkömmen, Gellivare, Sweden.	R. Mauzelius.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Syenite.	Gneissoid.
5	II''.5(6).1(2).2.	or 54.49 di 12.53 ab 0.26 ol 7.63 an 5.00 mt 6.73 ne 8.38 il 2.13 hm 1.60 ap 1.34	Gaussberg, Kaiser Wilhelm II Land, Antarctica.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (1), p. 81, 1906.	Leucite basalt.	

SUBRANG 3. SODIPOTASSIC. ILMENOSE. (C. I. P. W., 1902.)

1	II.5(6).1.''.3.	or 48.37 ac 17.56 ab 19.91 ns 0.37 ne 7.10 di 4.61 ol 0.69 il 0.76	St. Hilaire Mountain, Rouville County, Quebec.	M. F. Connor.	J. J. O'Neill, Can. G. S. Mem. 43, p. 61, 1914.	Tinguaite.	
2	(I)II.5.1(2).3(4).	or 34.47 di 5.16 ab 44.54 ol 2.36 an 5.28 mt 2.78 ne 2.27 il 1.82 ap 0.34	Lachute, Quebec.	M. Dittrich.	A. Osann, Can. G. S. A. R. XII (1899), p. 90, 1902.	Syenite gneiss.	Probably igneous.
3	II.5.1.3.⊙.	Q 1.26 ac 2.77 or 31.69 di 15.37 ab 38.77 hy 2.91 mt 4.18 il 1.37 ap 0.67	Peninsula, Port Coldwell, Ontario.	A. H. A. Robinson.	A. P. Coleman, A. J. S., XIV, p. 152, 1902.	Augite syenite.	Also in Rep. Bur. Min. Ont., XI, p. 211, 1902.
4	II.5.1.3.⊙.	Q 2.52 ac 2.77 or 37.81 di 11.60 ab 37.73 hy 5.56 mt 2.55 il 0.30	Beverly, Essex County, Massachusetts.	F. E. Wright.	F. E. Wright, T. M. P. M., XIX, p. 318, 1900.	Umptekite.	In W. T., p. 251.
5	(I)II.5.1.3''.	Q 5.22 ac 4.16 or 33.36 di 4.32 ab 45.06 hy 1.30 hm 5.12	Rand Hill, Beekmantown, Clinton County, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R. LIV (1900), p. R 78, 1902.	Syenite porphyry.	
6	''II.(4)5.1(2).3''.	Q 7.68 di 6.53 or 28.91 hy 5.55 ab 39.32 mt 3.25 an 4.17 il 1.98 sp 0.67	Bear Creek Canyon, Colorado Springs quadrangle, Colorado.	G. Steiger.	G. I. Finlay, U. S. G. S. B. 419, p. 100, 1910.	Lampro- phyre.	
7	(I)II.5.1.3.	Q 0.54 di 4.97 or 41.14 wo 0.81 ab 44.54 mt 1.62 an 1.95 il 1.67 hm 1.92 ap 0.67	Braemar, Aberdeenshire, Scotland	W. Pollard.	J. J. H. Teall, G. S. U. K., Mem. N. W. Highl., p. 444, 1907.	Aegirite granulite.	
8	(I)II.5.1.3(4).	or 35.58 ac 0.92 or 49.25 di 6.75 ne 1.70 ol 3.45 mt 1.39 il 0.46 ap 0.34	Seglinde, Almunge, Sweden.	N. Sahlbom.	P. Quensel, B. G. Inst. Ups., XII, p. 154 (1913), 1914.	Umptekite.	Cf. No. 27, I.5.1.4.
9	II.5.1(2).3(4).	Q 0.48 di 7.88 or 28.91 wo 1.28 ab 42.97 mt 11.83 an 5.00 il 0.61	Böle, Ragunda Massif, Jemtland, Sweden.	H. Santesson.	A. G. Högbom, Sver. G. Und. Afh., 182, p. 45, 1899.	Syenite.	Not in W. T.

CLASS II. DOSALANE—Continued.

RANG. I. PERALKALIC. UMPTEKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
10	60.61	15.04	1.31	3.03	3.11	3.78	4.70	5.30	1.32		0.78	0.89			99.87	
A2. II	1.010	.147	.008	.042	.078	.068	.076	.058			.010	.006				
11	57.21	17.87	5.92	0.76	2.26	4.50	5.83	5.72	n. d.		0.43	0.14			100.64	
A2. II	.953	.175	.037	.011	.057	.080	.094	.061			.005	.001				
12	57.49	16.54	4.85	0.63	4.73	1.07	3.79	7.23	3.08		0.94	0.43		SO ₃ 0.11	100.89	2.618
B2. III	.958	.162	.030	.009	.118	.019	.061	.077			.012	.003				
13	56.99	15.65	3.56	1.99	4.43	3.75	4.41	6.50	2.22		0.83	0.41		SO ₃ 0.10	100.84	2.681
B2. III	.950	.153	.022	.028	.111	.067	.071	.069			.010	.003				
14	64.46	14.96	0.95	3.73	1.36	3.30	4.39	5.44	1.07		trace	none	trace		99.66	
A3. III	1.074	.147	.006	.052	.034	.059	.071	.058			—	—	—			
15	57.33	14.06	2.07	3.59	3.55	5.68	3.34	6.32	3.08		1.05		0.09		100.16	
A2. II	.956	.138	.013	.050	.089	.102	.054	.067			.013		.001			
16	63.40	13.99	2.14	1.65	2.31	5.27	5.04	5.41	0.92						100.13	
A3. III	1.057	.137	.013	.023	.058	.095	.081	.057								
17	62.12	16.17	2.08	4.84	1.40	2.56	5.15	5.27	0.57		0.74				100.90	2.72
A3. III	1.035	.159	.013	.067	.035	.046	.083	.056			.009					
18	59.92	14.30	7.50	0.42	0.72	1.90	5.32	5.77	2.49	0.34	0.87	0.58	0.06	ZrO ₂ 0.11 SO ₃ 0.06 BaO 0.05	100.30	
A1. I	.999	.140	.047	.006	.018	.034	.085	.062			.011	.004	.001			
19	61.80	16.39	3.44	0.48	0.58	2.30	6.70	7.04	0.94			0.57			100.24	
A3. III	1.030	.161	.022	.007	.015	.041	.108	.075				.004				
20	61.60	17.11	3.09	0.54	1.04	3.25	5.35	6.11	0.63		0.79	0.06			99.57	
A2. II	1.027	.168	.019	.008	.026	.058	.086	.065			.010	—				
21	65.10	14.10	2.70	1.71	2.45	1.55	5.45	4.92	2.10		0.39				100.47	
A3. III	1.085	.138	.017	.024	.061	.028	.088	.052			.005					
22	56.40	15.84	6.48	3.54	0.21	1.52	5.80	5.78	3.96			0.13			99.66	
A3. III	.940	.155	.041	.049	.005	.027	.094	.062				.001				
23	60.20	17.86	1.10	2.02	0.32	3.60	6.36	5.94	2.46						99.86	
A3. III	1.003	.175	.007	.028	.008	.064	.103	.063								
24	59.04	16.21	1.04	2.64	0.24	1.93	9.78	6.59	1.60		0.76			Cl 0.22	100.05	
A3. III	.984	.159	.006	.037	.006	.034	.158	.070			.010					

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBBRANG 3. SODIOPOTASSIC. ILMENOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	II.5.1(2).3''.	Q 3.18 di 7.39 or 31.14 hv 7.41 ab 39.82 mt 1.86 an 4.17 il 1.52 ap 2.02	Sommerau, Bl. Triberg, Baden.	M. Dittrich.	A. Sauer, Erl. G. Kt. Bad., No. 100, p. 24, 1899.	Kersantite.	Not in W. T.
11	II.5(6).1(2).3(4).	or 33.92 di 12.31 ab 31.96 hv 1.39 an 5.56 il 0.76 ne 9.37 hm 4.96 ap 0.34	Remscheid, Siebengebirge.	Güttes.	H. Laspeyres, D. Siebengebirge, p. 320, 1901.	Trachyte.	Cf. No. 44, II.5.2.3.
12	II.5.1.3.⊙.	or 42.81 hy 10.60 ab 31.96 ol 0.84 an 2.50 il 1.37 C 1.53 hm 4.85 ru 0.24 ap 1.01	Gotteskopf, Ilmenau, Thuringia.	Fischer.	H. Loretz, Jb. Pr. G. L.-A., XIII (1892), p. 135, 1893.	Porphyrite.	In W. T., p. 251.
13	II.5.1''3.	or 38.36 di 9.50 ab 32.49 ol 4.69 an 3.61 mt 4.18 ne 2.56 il 1.52 hm 0.64 ap 1.01	Gotteskopf, Ilmenau, Thuringia.	Fischer.	H. Loretz, Jb. Pr. G. L.-A., XIII (1892), p. 135, 1893.	Porphyrite.	In W. T., p. 251.
14	''II.(4)5.1(2).3.	Q 8.58 di 9.63 or 32.25 hv 4.30 ab 37.20 mt 1.39 an 5.00	Hengstberg, n. Grimma, Saxony.	P. Jannasch.	H. Rosenbusch, Elem. Gest., p. 269, 1898.	Quartz porphyry.	In W. T., p. 251.
15	II.5.1(2).3.	or 37.25 di 18.97 ab 28.30 hv 2.46 an 4.73 ol 0.45 mt 3.02 il 1.98	Gailbach, Spessart, Bavaria.	E. Goller.	E. Goller, N. J. B. B., VI, p. 566, 1889.	Kersantite.	In W. T., p. 251.
16	II.5.1.3''.	Q 4.08 ac 0.46 or 31.69 di 15.01 ab 41.92 wo 3.13 mt 3.02	Monte Inverno, Monzoni, Tyrol.	C. Doelter.	C. Doelter, Anz. Ak. Wiss. Wien, XXXIX, p. 231, 1902.	Syenite porphyry.	
17	''II.5.1''3''.	Q 3.30 di 6.10 or 31.14 hv 6.36 ab 43.49 mt 3.02 an 5.56 il 1.37	Isla Persa, Bernina Gebiet, Switzerland.	L. Hezner.	U. Grubenmann, Schw. Chem. Zeit., I, p. (2), 1914.	Syenite.	
18	''II.5.1.3.	Q 5.40 ac 2.77 or 34.47 di 3.67 ab 41.39 hv 0.10 il 1.06 hm 6.56 tn 0.78 ap 1.34	Monte Muradu, Macomer, Sardinia.	H. S. Wash- ington.	H. S. Washington, A. J. S., XXXVI, p. 584, 1913.	Trachyte.	Not described.
19	''II.5''1.3.	or 41.70 ac 10.16 ab 35.37 di 4.97 ne 5.25 wo 0.70 ap 1.34	Coral Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, N. Arch. Mus., III, p. 68, 1911.	Pulaskite.	
20	(I)II.5.1(2).3''.	Q 0.06 di 5.62 or 36.14 wo 3.48 ab 45.06 il 1.22 an 4.73 hm 3.09 tn 0.39	Melfi, Sokoro Region, Chad Territory, French Kongo.	Pisani.	Gentil and Freydenberg, C. R., CXLVI, p. 354, 1908.	Arfvedsonite syenite.	
21	(I)II.(4)5.1.3(4).	Q 9.48 ac 0.92 or 28.91 di 6.08 ab 45.06 hv 3.53 mt 3.94 il 0.76	Bet. Tunbaba and Haumeni, Timor Island.	F. Pisani.	H. A. Brouwer, N. J. Ch., 1913, p. 572.	Trachyte.	
22	(I)II.5.1.3(4).	or 34.47 ac 0.46 ab 44.54 di 3.07 ne 2.27 wo 1.28 mo 9.51	Mohanui, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 405, 1906.	Phonolite.	
23	(I)II.5''1.3(4).	or 35.03 di 6.93 ab 40.35 wo 4.06 an 2.50 mt 1.62 ne 7.38	Mount Tapioi, Raiatea, Society Islands.	P. Marshall.	P. Marshall, Aust. A. A. S., XIII, p. 199, 1912.	Phonolite.	
24	II.5(6).1.3.	or 38.92 ac 2.77 ab 30.39 ns 7.69 ne 8.80 di 8.10 il 1.52	Pahiraia, Society Islands.	P. Marshall.	P. Marshall, Aust. A. A. S., XIII, p. 198, 1912.	Phonolite.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. UMPTEKASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	58.17	16.07	1.30	5.04	1.20	3.42	7.41	4.65	0.41	0.19	2.09	0.42	0.07	CO ₂ none	100.44	2.74
A2. II	.970	.157	.008	.070	.030	.061	.119	.050			.026	.003	.001	SO ₃ none Cl none		
2	56.05	17.02	9.10	4.20	0.12	0.72	6.10	5.12	0.36		0.47	0.04	0.08		99.38	
A2. II	.934	.167	.057	.058	.003	.013	.098	.054			.006	—	.001			
3	58.74	14.61	0.48	3.70	5.47	3.34	5.70	3.79	0.27	0.17	1.87	1.00		CO ₂ none	99.14	
B2. III	.979	.143	.003	.051	.137	.060	.092	.040			.023	.007				
4	59.01	18.18	1.63	3.65	1.05	2.40	7.03	5.34	0.50	0.15	0.81	trace	0.03	ZrO ₂ trace Cl 0.12 BaO 0.08 SrO trace Li ₂ O trace	99.98	
A1. I	.983	.178	.010	.050	.026	.043	.113	.056			.010	—	—			
5	64.28	15.97	2.91	3.18	0.03	0.85	7.28	5.07	0.20		0.50	0.08	trace	BaO none	100.33	2.703
A2. II	1.071	.156	.018	.044	.001	.015	.117	.054			.006	—	—			22°
6	60.02	14.86	2.80	6.57	0.38	3.33	5.64	4.26	0.78	0.20	0.90	0.63	0.20		100.57	2.80
A2. II	1.000	.146	.018	.092	.010	.060	.091	.046			.011	.004	.003			20°
7	59.52	15.58	7.24	1.86	2.11	1.81	6.82	3.48	2.23						100.65	
A3. III	.992	.152	.045	.026	.053	.032	.110	.037								
8	57.45	15.75	11.12	1.74	1.94	0.12	7.84	3.51	1.23						100.70	
A3. III	.958	.154	.069	.024	.049	.002	.139	.037								
9	59.66	16.97	3.18	1.15	0.80	2.32	8.38	4.17	2.53	0.07	trace	0.14	0.19		99.56	
A2. II	.994	.166	.020	.016	.020	.041	.135	.044			—	.001	.003			
10	63.69	15.03	2.51	2.41	0.80	3.30	6.54	2.46	2.23			trace	0.55	SO ₃ trace Cl trace Cu trace	99.52	2.55
A3. III	1.062	.147	.015	.033	.020	.059	.105	.026				—	.008			15°
11	59.54	13.09	4.74	6.13	1.33	3.81	5.88	3.86	0.68			0.59	0.49	CO ₂ 0.18	100.32	
A2. II	.992	.128	.029	.085	.033	.068	.095	.041				.004	.007			
12	58.75	17.46	2.37	2.45	1.03	2.55	6.81	5.87	0.74		0.77	0.30	trace	CO ₂ 0.12 SO ₃ 0.16 Cl 0.65	100.03 .15	2.672
A1. I	.979	.171	.015	.034	.026	.046	.110	.063			.010	.002	—		99.88	
13	58.46	16.56	5.69	2.59	0.62	2.62	6.23	5.44	1.21		0.28	0.23	trace	CO ₂ 0.04 SO ₃ 0.16 Cl 0.29	100.26	2.674
A1. I	.974	.162	.036	.036	.016	.046	.100	.058			.004	.002				
14	60.13	16.53	2.86	2.55	1.20	1.61	8.06	3.99	0.97	0.55	0.73	0.57	0.46	S none NiO none BaO 0.11	100.32	
A1. I	1.002	.162	.018	.036	.030	.029	.130	.042			.009	.004	.007			
15	58.81	14.81	4.58	4.21	0.80	2.33	5.60	4.96	0.82	2.00	0.76	0.20	0.27	S none NiO none BaO 0.03	100.18	
A1. I	.980	.145	.029	.058	.020	.041	.090	.053			.010	.001	.004			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. UMPTEKOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	II.5(6).1."4.	or 27.80 ac 3.70 ab 40.61 ns 0.49 re 8.38 di 11.85 ol 2.26 il 3.95 ap 1.01	Kakarsuak, Ilmausak Region, Greenland.	C. Winther.	N. V. Ussing. G. Juehb., p. 196, 1911.	Nord- markite.	
2	(I)II.5.1"(3)4.	or 30.02 ol 0.31 ab 50.56 mt 12.06 an 3.61 il 0.91 ne 0.42 hm 0.80 C 0.20	Craigmont, Renfrew County, Ontario.	M. F. Connor.	Adams and Barlow, Tr. R. Soc. Can., II (4), p. 69, 1909.	Syenite.	Also in Can. G. S. Mem. 6, p. 324, 1910.
3	II.5.1"4.	or 22.24 di 5.75 ab 48.21 hy 9.45 an 3.06 ol 3.44 mt 0.70 il 3.50 ap 2.35	South Newcastle, Boothbay quadrangle, Maine.	M. W. Adams.	I. H. Ogilvie, Ann. N. Y. Ac. Sci., XVII, p. 542, 1907.	Monzonite.	
4	(I)II.5(6).1."4.	or 31.14 di 7.92 ab 42.97 ol 1.92 an 2.50 mt 2.32 ne 8.80 il 1.52	Red Hill, New Hamp- shire.	W. F. Hille- brand.	W. S. Bayley, B. G. S. A., III, p. 250, 1892.	Nephelite syenite.	In W. T., p. 253.
5	(I)II.5.1.(3)4.	Q 2.04 ac 6.93 or 30.03 di 3.72 ab 53.45 hy 2.74 mt 0.70 il 0.91	Andrews Point, Cape Ann, Essex County, Massachusetts.	H. S. Wash- ington.	H. S. Washington, A. J. S., VI, p. 178, 1898.	Sölvbergite.	In W. T., p. 253.
6	II.5.1."4.	Q 2.76 di 9.35 or 25.58 hy 4.86 ab 47.68 mt 4.18 an 2.50 il 1.67 ap 1.34	Pine Hill, West Quincy, Massachusetts.	C. H. Warren.	C. H. Warren, Proc. Am. Ac., XLIX, p. 282, 1913.	Rhomben porphyry.	Xenolith in granite, No. 25, I.4.1.3.
7	"II.5.1.4.	Q 1.20 di 5.83 or 20.57 hy 2.60 ab 57.64 mt 6.03 an 1.39 hm 2.04	Little Montreal River, Keweenaw Point, Michigan.	F. P. Burrall.	L. L. Hubbard, Mich. G. S., VI (II), p. 26, 1898.	Felsite porphyrite.	Not in W. T.
8	II.5"1.4.	or 20.57 ac 10.16 ab 50.56 di 0.45 ne 5.82 ol 3.29 mt 5.57 hm 3.68	Little Montreal River, Keweenaw Point, Michigan.	F. P. Burrall.	L. L. Hubbard, Mich. G. S., VI (II), p. 26, 1898.	Felsite porphyrite.	Not in W. T.
9	"II.5(6).1.4.	or 24.46 ac 6.01 ab 47.68 di 7.29 ne 8.80 wo 0.70 mt 1.62 ap 0.34	Peaked Butte, Crazy Moun- tains, Montana.	W. H. Melville.	Wolff and Tarr, B. Mus. Comp. Zool., XVI, p. 232, 1893.	Nephelite syenite.	In W. T., p. 253.
10	(I)II.(4)5.1(2).4.	Q 9.30 di 10.06 or 14.46 hy 0.36 ab 55.02 mt 3.48 an 4.45	Yate Volcano, Chile.	H. Ziegen- speck.	H. Ziegenspeck, In. Diss. Jena, p. 42, 1883.	Andesite.	In W. T., p. 253.
11	II.5.1."4.	Q 1.98 ac 3.70 or 22.80 di 13.10 ab 45.59 hy 5.96 mt 4.87 ap 1.34	Tamaya, Chile.	C. Schwarz.	A. v. Groddeck, Z. D. G. G., XXXIX, p. 251, 1887.	Porphyry.	In W. T., p. 253.
12	(I)II.5"1.(3)4.	or 35.03 di 7.39 ab 41.39 ol 1.04 an 1.95 mt 3.48 ne 6.25 il 1.52 hl 1.05 ap 0.67	Cabo Frio, Rio de Janeiro, Brazil.	F. E. Wright.	F. E. Wright, T. M. P. M., XX, p. 248, 1901.	Umptekite.	
13	(I)II.5.1.(3)4.	or 32.25 di 3.46 ab 48.73 wo 1.74 an 2.22 mt 7.42 ne 0.85 il 0.61 hl 0.47 hm 0.64 ap 0.67	Cabo Frio, Rio de Janeiro, Brazil.	F. E. Wright.	F. E. Wright, T. M. P. M., XX, p. 243, 1901.	Nordmarkite.	
14	(I)II.5.1.4.	or 27.35 ac 4.62 ab 55.02 di 3.65 ne 4.26 ol 2.73 mt 1.86 il 1.37 ap 1.34	Tobermory Mull, Scotland.	E. G. Radley.	J. J. H. Teall, G. S. G. B., Sum. Prog. (1913), p. 80, 1914.	Phonolitic trachyte.	
15	"II.5.1.(3)4.	Q 2.40 di 8.39 or 29.47 hy 0.70 ab 47.16 mt 6.73 an 0.56 il 1.52 ap 0.34	Garnhnaich Mhor, Carsaig Bay Mull, Scotland.	E. G. Radley.	J. J. H. Teall, G. S. G. B., Sum. Prog. (1912), p. 70, 1913.	Alkali syenite.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. UMPTEKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16	57.98	17.92	4.23	2.72	0.34	2.12	6.99	5.24	1.76	0.64	0.20	0.08	0.21	CO ₂ none S none NiO none BaO none SrO none	111.43	
A1. I	.966	.176	.026	.038	.009	.038	.113	.055			.003	—	.003			
17	58.47	18.60	1.92	4.77	0.94	0.99	5.52	3.30	2.19	0.50	2.17	0.45	0.19	Cl 0.02 BaO 0.04 Li ₂ O trace	100.11	
A1. I	.975	.182	.012	.067	.024	.018	.089	.035			.027	.003	.003			
18	62.70	16.40	3.34	2.35	0.79	0.95	7.13	5.25	0.70		0.92		trace		100.53	
A3. III	1.045	.161	.021	.033	.020	.017	.115	.056			.012		—			
19	58.90	17.70	3.94	2.37	0.54	1.05	7.39	5.59	1.90		0.40	trace	0.55		100.33	
A2. II	.982	.173	.025	.033	.014	.019	.119	.060			.005	—	.008			
20	58.81	18.54	5.00	1.80	1.02	3.81	7.90	3.06	n. d.						99.94	
A3. III	.980	.182	.031	.025	.026	.068	.127	.033								
21	61.56	13.59	2.16	3.16	5.44	4.41	6.17	2.77	0.24		0.12	0.03	0.07	BaO 0.04	99.72	
A2. II	1.026	.133	.014	.044	.136	.079	.100	.030			.002	—	.001			
22	63.82	14.81	1.63	1.25	3.48	5.26	6.37	2.78	0.20	(0.06)	0.38	0.02	0.07	CO ₂ 0.25 S 0.01	100.33	
A2. II	1.064	.145	.010	.018	.087	.094	.103	.030			.005	—	.001			
23	61.24	13.95	3.81	1.45	4.23	3.69	5.13	4.53	0.38	(0.09)	0.82	0.01	0.14	CO ₂ 0.51 S 0.02 BaO 0.05	99.96	
A1. I	1.021	.137	.024	.020	.106	.066	.082	.048			.010	—	.002			
24	60.78	14.95	4.04	2.27	2.39	3.22	5.81	3.53	0.53	(0.18)	2.14	0.01	0.07		99.74	
A2. II	1.013	.147	.025	.032	.060	.057	.094	.037			.027	—	.001			
25	59.57	15.14	5.50	1.62	2.46	3.42	6.13	3.27	0.57		1.82		0.36		99.86	
A2. II	.993	.147	.034	.022	.062	.061	.098	.035			.023		.005			
26	53.31	14.19	10.92	4.29	1.96	4.38	6.27	2.19	0.40	(0.15)	1.80	0.43	0.06	S 0.01	100.25	
A2. II	.889	.139	.068	.060	.049	.079	.102	.023			.023	.003	.001			
27	63.71	16.59	2.92	0.66	0.90	3.11	8.26	2.79	0.19		0.86		0.20		100.19	
A2. II	1.062	.163	.018	.009	.023	.056	.135	.030			.010		.003			
28	60.89	17.16	3.60	3.18	0.49	3.07	6.88	4.23	0.37						99.87	
A3. III	1.015	.168	.022	.044	.012	.055	.111	.045								
29	63.45	15.87	1.81	0.77	0.72	4.08	6.84	4.31	1.08		0.44	1.16			100.53	
A2. II	1.058	.155	.011	.011	.018	.073	.110	.046			.005	.008				
30	58.28	12.65	6.17	7.38	1.54	2.54	6.34	1.40	2.22		1.38			FeS ₂ 0.61	100.81	2.80
A3. III	.971	.124	.039	.103	.039	.045	.102	.015			.017					
31	64.95	14.27	3.37	1.89	0.87	2.60	6.85	3.39	0.24	0.35	0.81	0.11			99.70	
A2. II	1.083	.140	.021	.026	.022	.046	.111	.036			.010	.001				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. UMPTEKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	(I)II.5''1.''4.	or 30.58 di 4.92 ab 45.06 wo 1.04 an 2.22 mt 6.03 ne 7.67 il 0.46	Newton o' Fintry, n. Glasgow, Scotland.	E. G. Radley.	J. J. H. Teall, G. S. G. B., Sum. Prog. (1907), p. 56, 1908.	Phonolite.	
17	(I)II.(4)5.1.4.	Q 9.60 hy 6.49 or 19.46 mt 2.78 ab 46.53 il 4.10 an 2.22 ap 1.01 C 5.10	Skomer Island, Pembrokeshire, Wales.	E. G. Radley.	H. H. Thomas, Q. J. G. S., LXVII, p. 192, 1911.	Soda trachyte.	
18	(I)II.5.1.(3)4.	or 31.14 ac 4.62 ab 55.02 di 3.86 ol 1.14 mt 2.55 il 1.82	Lougenthal, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 80, 1894.	Sölvbergite.	In W. T., p. 253.
19	(I)II.5(6).1.(3)4.	or 33.36 ac 2.77 ab 42.97 di 4.45 ne 8.80 ol 1.03 mt 4.41 il 0.76	Kjose Aklungen, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 102, 1894.	Sölvbergite.	In W. T., p. 253.
20	(I)II.5''1(2).4.	or 18.35 di 5.62 ab 53.91 wo 2.32 an 6.12 mt 5.80 ne 6.82 hm 0.96	Ostvaagö, Lofoten Islands, Norway.	T. Matthiesen.	C. F. Kolderup, Berg. Mus. Aarb., 1898, No. 7, p. 23.	Soda syenite.	In W. T., p. 253.
21	II.5.1.4.⊙	or 16.65 di 16.84 ab 52.40 hy 9.41 an 0.83 mt 3.25 il 0.30	Liné Adit, Gellivare, Sweden.	R. Mauzelius.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Syenite.	
22	II.5.1''4.	Q 4.14 di 17.81 or 16.68 hy 0.93 ab 53.97 mt 2.32 an 3.34 il 0.76	Kiirunavaara, Lapland, Sweden.	K. Schröder.	P. Geijer, G. Kir. Dist., p. 49, 1910.	Syenite porphyry.	
23	II.5.1.(3)4.	Q 4.23 di 10.37 or 26.69 hy 5.80 ab 42.97 mt 2.78 an 1.95 il 1.52 hm 1.92	Luossavaara, Lapland, Sweden.	R. Mauzelius.	P. Geijer, G. Kir. Dist., p. 54, 1910.	Syenite porphyry.	
24	II.5.1(2).4.	Q 5.64 di 8.86 or 20.57 hy 1.90 ab 49.25 mt 1.39 an 4.45 il 4.16 hm 3.04	Near Kiirunavaara, Lapland, Sweden.	G. Nyblom.	P. Geijer, G. Kir. Dist., p. 33, 1910.	Syenite porphyry.	
25	II.5.1(2).4.	Q 3.48 di 10.15 or 19.46 hy 1.50 ab 51.35 mt 0.93 an 3.89 il 3.50 hm 4.80	Kiruna, Lapland, Sweden.	H. Santesson.	O. Stutzer, N. J. B. B., XXIV, p. 563, 1907.	Soda syenite.	
26	II.5.1(2).4''.	Q 0.42 di 10.58 or 12.79 wo 0.70 ab 53.45 mt 8.82 an 3.89 il 3.50 hm 4.80 ap 1.01	Geologen, Kiirunavaara, Lapland, Sweden.	G. Nyblom.	P. Geijer, G. Kir. Dist., p. 10, 1910.	Syenite.	
27	(I)II.5.1.4.	or 16.68 ac 0.92 ab 69.69 di 4.97 wo 3.60 il 1.37 hm 2.56 pf 0.27	Umpjärvi, Umptek, Kola, Finland.	W. Petersson.	W. Ramsay, Fennia, XI, p. 205, 1894.	Umptekite.	In W. T., p. 253.
28	(I)II.5.1''4.	or 25.02 di 8.04 ab 55.54 wo 1.04 an 3.34 mt 5.10 ne 1.42	Steinburg, Harteniels, Westerwald, Germany.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn., LIII, p. 51, 1886.	Trachyte.	In W. T., p. 253.
29	(I)II.5.1.4.	Q 3.48 di 3.89 or 25.58 wo 3.25 ab 57.64 mt 1.39 il 0.76 hm 0.80 ap 2.69	Hielsberg, Westerwald, Germany.	H. Schneider- höhn.	H. Schneiderhöhn, Jb. Pr. G. L.-A., XXX (1909), p. 306, 1910.	Phonolitic trachyte.	
30	II.(4)5.1.4(5).	Q 7.86 di 8.88 or 8.34 hy 5.53 ab 53.45 mt 9.05 an 1.95 il 2.58	Bohulib, Bohemia.	Laxa.	Barvir, Arch. Nw. Di. Böhm., XII, 1901.	Kersantite.	Osann, III (1), p. 129.
31	(I)II.(4)5.1.4.	Q 8.88 ac 3.23 or 20.02 di 5.24 ab 54.49 wo 2.20 mt 3.25 il 1.52 ap 0.34	Between Ghada- mes and Tripoli, Tripoli, Libya.	G. Manasse.	G. Manasse, B. Soc. G. It., XXIV, p. 143, 1905.	Andesite.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. UMPTEKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
32	57.95	13.80	5.72	1.73	0.53	1.43	8.95	2.71	1.71		0.55		2.76	ZrO ₂ 1.57 Cl 0.17	99.58	
A2. II	.966	.135	.036	.024	.013	.025	.145	.029			.007		.039			
33	51.26	16.90	6.11	5.32	2.59	2.96	6.86	2.28	4.07		0.76	1.59	0.15		100.85	
A2. II	.854	.166	.038	.074	.065	.053	.111	.024			.010	.011	.002			
34	59.49	17.17	2.27	3.33	1.12	2.62	6.48	5.26	0.57	0.37	0.59	0.38			99.65	
A2. II	.992	.168	.014	.046	.028	.046	.105	.056			.007	.003				
35	58.37	16.65	4.09	3.03	0.37	1.66	7.28	5.46	1.40	0.96	0.21	0.08	0.43		99.99	
A2. II	.973	.163	.026	.042	.009	.030	.118	.058			.003	—	.006			
36	60.75	14.50	6.18	2.94	0.43	3.36	5.88	3.74	1.44		0.46	0.25	0.55	CO ₂ trace	100.48	
A2. II	1.013	.142	.039	.041	.011	.060	.095	.039			.006	.002	.008			
37	59.56	13.94	5.82	2.98	0.61	4.72	6.05	3.01	2.31		0.31	0.11	0.48	SO ₂ trace	99.90	
A2. II	.993	.137	.036	.042	.015	.084	.098	.032			.004	.001	.007			
38	52.05	15.10	2.15	5.67	2.44	6.93	6.10	3.47	3.10		1.82	0.60			99.43	
A2. II	.868	.148	.014	.079	.061	.123	.098	.037			.023	.004				
39	59.39	14.34	6.64	0.92	1.92	8.65	5.83	3.09	0.12						100.90	2.604
A3. III	.990	.141	.041	.013	.048	.155	.094	.033								
40	62.25	15.49	5.44	0.15	0.84	1.82	8.18	2.57	1.26		1.85				99.85	
A2. II	1.038	.152	.034	.002	.021	.032	.132	.028			.023					
41	56.78	14.47	2.80	6.05	0.34	2.47	8.67	4.51	1.70	0.56	2.00		trace	NiO 0.05	100.40	
A2. II	.946	.142	.018	.084	.009	.045	.140	.048			.025		—			
42	55.66	17.18	4.43	3.56	0.73	1.14	7.02	5.30	4.53						99.55	
A3. III	.928	.168	.028	.050	.018	.020	.113	.056								
43	54.15	16.09	7.35	4.90	1.61	3.86	5.94	4.41	1.40		0.41	0.42		Cl 0.40	100.74	
A2. II	.903	.158	.046	.068	.040	.069	.096	.047			.005	.003				
44	53.56	15.28	7.36	5.42	1.29	4.30	5.51	4.88	3.12						100.72	
A3. III	.893	.150	.046	.075	.032	.077	.089	.052								
45	53.28	16.38	6.11	4.52	2.50	3.09	6.42	4.18	3.52			0.15			100.15	
A3. III	.888	.161	.038	.063	.063	.055	.103	.045				.001				
46	62.19	17.43	1.65	2.64	0.40	0.86	8.28	5.03	0.39	0.14	0.37	0.14	0.32	CO ₂ 0.02 ZrO ₂ 0.04 SO ₂ none Cr ₂ O ₃ trace NiO none BaO 0.03 SrO none	99.93	
A1. I	1.037	.171	.010	.037	.010	.015	.134	.053			.005	.001	.005			
47	60.12	17.67	3.75	3.40	0.53	2.40	6.78	4.43	0.49						99.57	
A3. III	1.002	.173	.023	.047	.013	.043	.110	.047								

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. UMPTEKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
32	II.5''1.4.	or 16.12 ac 16.63 ab 45.85 ns 0.12 ne 5.25 di 6.04 hl 0.28 ol 4.23 Z 2.38 il 1.06	Rouma, Los Islands, French Guinea.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 38, 1911.	Lujavrite.	"Endialyte- rich" Al ₂ O ₃ low? MnO high?
33	II.5.1(2).4''.	or 13.34 ol 7.41 ab 53.45 mt 8.82 an 4.46 il 1.52 ne 2.56 ap 3.70 C 1.53	Handeda District, Mulazeni, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Eritr., p. 105, 1909.	Kersantite.	
34	(I)II.5.1.(3)4.	or 31.14 di 6.71 ab 47.42 ol 2.03 an 1.95 mt 3.25 ne 4.12 il 1.06 ap 1.01	Bongaisana, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 176, 1913.	Phonolitic trachyte.	
35	''II.5(6).1.(3)4.	or 32.25 ac 6.01 ab 40.87 di 7.28 ne 7.67 mt 3.02 il 0.46	Mount Höhnel, Kenya Volcano, Brit. East Africa.	G. T. Prior.	G. T. Prior, Min. Mag., XIII, p. 240, 1903.	Phonolite.	
36	II.(4)5.1.4.	Q 7.98 di 3.37 or 21.68 wo 3.48 ab 49.78 mt 9.05 an 2.22 il 0.91 ap 0.67	Aden, Arabia.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XXIV, p. 181, 1908.	Trachy- andesite.	
37	II.''5.1.4.	Q 6.06 di 5.54 or 17.79 wo 5.80 ab 51.35 mt 8.35 an 1.95 il 0.61 ap 0.34	Aden, Arabia.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XXIV, p. 182, 1908.	Trachy- andesite.	
38	II.5.1''4.	Q 1.92 di 22.23 or 20.57 hy 0.66 ab 51.35 mt 3.25 an 3.61 il 3.50	Vo-men-Ko, Yunnan, China.	Pisani.	J. Deprat, Mem. Serv. G. Indoch., I (1), p. 229, 1912.	Augite syenite.	
39	II.5.1(2).4.	Q 0.66 di 10.37 or 18.35 wo 10.79 ab 49.25 mt 3.02 an 3.89 hm 4.48	Simaboer, Merapi Volcano, Sumatra.	A. Clausinger.	R. D. M. Verbeek, Sum. Westk., p. 518, 1883.	Andesite pitchstone.	Not in W. T.
40	(I)II.5.1.4.	Q 2.76 ac 3.70 or 15.57 di 3.38 ab 64.97 ol 0.70 il 0.30 hm 4.16 tn 4.12	Engelsberg, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXIV, p. 96, 1909.	Syenite pegmatite.	"Like bow- ralite."
41	II.5(6).1.''4.	or 26.69 ac 8.32 ab 34.58 ns 3.42 ne 7.67 di 10.97 ol 2.25 il 3.80	Mount Flinders, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXIV, p. 93, 1909.	Phonolitic trachyte	
42	(I)II.5(6).1.''4.	or 31.14 ac 0.46 ab 40.87 di 4.67 ne 9.94 ol 1.75 mt 6.50	Purakanui, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S. LXII, p. 402, 1906.	Phonolite.	
43	II.5.1''4.	or 26.13 di 10.82 ab 41.85 ol 0.73 an 3.06 mt 10.67 ne 2.98 il 0.76 hl 0.70 ap 1.01	Signal Hill, Dunedin, New Zealand.	C. A. Cotton.	C. A. Cotton, Tr. N. Z. Inst., XLI, p. 120, 1909.	Phonolite.	
44	II.5(6).1''.(3)4.	or 28.91 di 14.11 ab 33.54 wo 0.81 an 2.50 mt 10.67 ne 7.10	See House, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 402, 1906.	Trachytoid phonolite.	
45	II.5(6).1''4.	or 25.02 di 8.77 ab 37.20 ol 3.88 an 3.61 mt 8.82 ne 9.09 ap 0.34	Otago Harbor, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 397, 1906.	Ulrichite (campton- itic tinguaite).	
46	(I)II.5.1.4.	or 29.47 ac 4.62 ab 51.87 ns 0.73 ne 5.40 di 2.88 ol 3.85 il 0.76 ap 0.34	Puu Waa Waa, North Kona, Hawaii.	W. F. Hille- brand.	W. Cross, J. G., XII, p. 514, 1904.	Trachyte obsidian.	
47	(I)II.5.1''4.	or 26.13 di 6.41 ab 53.45 ol 0.89 an 4.45 mt 5.34 ne 2.27	Heard Island, Indian Ocean.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (3), p. 262, 1908.	Trachyte.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. UMPTEKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
48	59.52	11.48	1.62	9.93	1.03	4.11	5.31	2.03	2.88	0.82	0.27	none	0.22	CO ₂ 0.41	99.63	2.51
A2. II	.992	.113	.010	.138	.026	.073	.085	.021			.003	—	.003			
49	61.01	16.62	3.55	2.81	0.06	3.27	5.92	5.22	1.13			trace	0.55	Cl trace	100.14	
A3. III	1.017	.163	.022	.039	.002	.058	.095	.056				—	.008			

RANG 1. PERALKALIC. UMPTEKASE.

1	60.00	16.88	1.83	3.02	1.40	3.16	9.31	0.94	1.53	0.43	0.42	0.14	0.12	CO ₂ 0.59 ZrO ₂ 0.03 S trace BaO 0.06 SrO 0.02 Li ₂ O trace	99.88	
A1. I	1.000	.166	.011	.042	.035	.056	.150	.010			.005	.001	.002			
2	45.32	13.09	21.74	7.12	0.18	2.19	7.51	0.17	0.24	(0.08)	1.15	0.32	0.04	CO ₂ 1.26 S 0.02	100.35	
A2. II	.755	.128	.136	.099	.005	.039	.121	.002			.014	.002	—			

RANG 2. DOMALKALIC. MONZONASE. (C. I. P. W., 1902.)

1	51.05	14.49	4.16	4.37	8.16	5.11	1.85	7.25	1.05		1.76	0.70			99.94	
A2. II	.951	.142	.026	.061	.204	.091	.030	.077			.022	.005				
2	59.58	14.45	1.52	3.09	4.19	4.74	2.69	7.54	0.50		0.77	0.51	trace	CO ₂ 0.11 Cl trace Ce ₂ O ₃ 0.13	2.764	
A2. II	.993	.142	.009	.043	.105	.085	.044	.080			.010	.004	—			
3	57.36	14.07	4.11	1.82	4.94	4.63	2.25	6.56	3.06		1.10				99.90	2.816
A3. III	.956	.138	.026	.025	.124	.082	.036	.070			.014					
4	56.39	12.88	2.36	3.54	7.83	4.06	1.30	7.84	1.33		2.07		trace		99.60	
A3. III	.940	.126	.015	.049	.196	.072	.021	.083			.026		—			
5	55.85	18.34	3.77	1.88	1.73	3.84	3.39	8.77	1.14		0.59	0.38		CO ₂ none ZrO ₂ none SO ₃ 0.05 BaO 0.17	99.90	
A1. I	.931	.180	.024	.026	.043	.069	.055	.094			.007	.003				
6	57.32	19.07	2.21	2.35	1.60	3.82	3.22	9.15	0.57		0.61	0.17		CO ₂ none SO ₃ trace BaO 0.12	100.21	2.611
A2. II	.955	.187	.014	.033	.040	.068	.052	.097			.008	.001				
7	57.31	14.41	1.21	4.37	7.80	6.90	1.35	6.38	0.18		0.40	0.30		CO ₂ none BaO none	100.61	
A2. II	.955	.141	.008	.061	.195	.123	.022	.068			.005	.002				
8	55.46	14.63	1.34	4.50	7.90	6.69	1.79	6.63	0.23	0.15	0.53	0.36		CO ₂ none	100.21	2.70
A2. II	.924	.143	.008	.062	.198	.119	.029	.071			.007	.003				10 ⁹
9	55.21	18.78	2.69	2.86	1.68	4.61	3.13	8.45	0.99		0.71	0.22		CO ₂ none ZrO ₂ 0.10 SO ₃ none BaO 0.18	99.61	
A1. I	.920	.181	.017	.010	.042	.082	.050	.090			.009	.002				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. UMPTEKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
48	II''.(4)5.1.4.	Q 7.32 di 16.02 or 11.68 hy 11.14 ab 44.54 mt 2.32 an 1.95 il 0.46	Musgrave-Peninsula, Carnley Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islds., p. 724, 1909.	Trachyte pitchstone.	
49	(I)II.5.1''.(3)4.	Q 0.94 di 6.63 or 31.14 wo 2.20 ab 49.78 mt 5.10 an 3.54	Cape Adare, Victoria Land, Antarctica.	J. A. Schofield.	David, Smeeth, and Schofield, J. R. Soc. N. S. W., XXIX, p. 473, 1895.	Trachyte.	In W. T., p. 253.

RANG 5. PERSODIC. KIRUNOSE. (P. GEIJER, 1910.)

1	''II.5''.1.5.	or 5.56 di 10.82 ab 68.90 ol 1.34 an 1.67 mt 2.55 ne 5.25 il 0.76 ap 0.34	Coalinga, Fresno County, California.	W. F. Hillebrand.	Arnold and Anderson, U. S. G. S. B. 398, p. 159, 1910.	Soda syenite.	Not fresh.
2	II''.5.1.5.	Q 0.42 hy 0.50 or 1.11 mt 19.72 ab 63.40 il 2.13 an 1.39 hm 8.16 ap 0.67 cc 2.80	Nokutussjärvi, Luossavaara, Lapland, Sweden.	R. Mauzelius.	P. Geijer, G. Kir. Dist., p. 67, 1910.	Magnetite syenite.	

RANG 2. DOPOTASSIC. CIMINOSE. (C. I. P. W., 1902.)

1	II''.5.2.2.	or 42.81 di 8.48 ab 12.05 ol 12.31 an 9.73 mt 6.03 ne 1.99 il 3.34 ap 1.68	Durbach, Schwarzwald, Baden.	Not stated.	A. Sauer, Mt. Bad. G. L.-A., II, p. 258 (1890), 1892.	Durbachite.	Cf. No. 146, p. 951. In W. T., p. 255.
2	II.5.(1)2.2(3).	Q 1.80 di 11.98 or 44.48 hy 7.95 ab 23.06 mt 2.09 an 5.00 il 1.52 ap 0.34	Piz Giuf, Aarmassif, Switzerland.	M. Dittrich.	F. Weber, Btr. G. Kt. Schw., XIV, p. 43, 1904.	Syenite.	
3	II.''5.2.2''.	Q 4.92 di 10.80 or 38.92 hy 7.40 ab 18.86 mt 2.55 an 8.90 il 2.13 hm 2.40	Alp Tobel, Rofna, Switzerland.	G. Ruetschi.	G. Ruetschi, In. Diss. Zür., p. 27, 1903.	Lamprophyre.	
4	II(III).5.''2.2.	Q 1.08 di 10.92 or 46.15 hy 15.59 ab 11.00 mt 3.48 an 6.12 il 3.95	Monte Catini, n. Volterra, Tuscany.	H. S. Washington.	H. S. Washington, A. J. S., IX, p. 47, 1900.	Mica trachyte (selagite).	In W. T., p. 255.
5	(I)II.5''.''2.2(3).	or 52.26 di 6.05 ab 17.29 ol 1.05 an 8.62 mt 4.41 ne 6.25 il 1.06 hm 0.80 ap 1.01	Bagnorea, n. Orvieto, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 370, 1897.	Leucite trachyte.	Complete in R. C. R., p. 67, 1906. In W. T., p. 255.
6	(I)II.5''.''2.2(3).	or 53.93 di 5.99 ab 16.77 ol 1.87 an 10.56 mt 3.25 ne 5.68 il 1.22 ap 0.34	Vetralla, Monte Vico, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, J. G., IV, p. 849, 1896.	Vulsinite.	Complete in R. C. R., p. 59, 1906. In W. T., p. 255.
7	II(III).5.2(3).2.	Q 0.30 di 14.46 or 37.81 hy 18.92 ab 11.53 mt 1.86 an 14.18 il 0.76 ap 0.67	La Colonetta, Monte Cimino, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, A. J. S., IX, p. 44, 1900.	Ciminite.	Complete in R. C. R., p. 63, 1906. In W. T., p. 255.
8	II''.5.2.2.	or 39.48 di 14.64 ab 15.20 hy 3.46 an 11.95 ol 1.18 mt 1.86 il 1.06 ap 1.01	Fontana Fiescoli, Monte Cimino, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, A. J. S., IX, p. 44, 1900.	Ciminite.	Complete in R. C. R., p. 63, 1906. In W. T., p. 255.
9	(I)II.5''.''2.2(3).	or 50.04 di 7.17 ab 15.20 ol 1.87 an 12.23 mt 3.94 ne 5.94 il 1.37 ap 0.67	Monte Venere, Vico Volcano, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, J. G., IV, p. 849, 1896.	Leucite trachyte.	Complete in R. C. R., p. 67, 1906. In W. T., p. 255.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
10	52.14	15.91	2.15	5.19	5.11	8.55	1.92	7.24	0.10	0.09	1.22	0.24		CO ₂ none ZrO ₂ trace SO ₃ 0.07 BaO 0.20	100.13	
A1. I	.869	.156	.014	.072	.128	.153	.031	.077			.015	.002				
11	50.28	19.58	10.60	3.63	1.11	1.16	1.30	9.15	1.97					S Insol. 0.35 0.33	99.21	2.815
B3. IV	.836	.192	.066	.050	.028	.021	.021	.098								21°
12	50.53	14.62	6.82	2.88	6.16	5.00	1.70	8.32	0.90		0.80	0.62			99.35	
A2. II	.842	.143	.043	.040	.154	.089	.027	.088			.010	.004				

RANG 2. DOMALKALIC. MONZONASE.

1	62.62	15.69	2.07	4.73	1.61	2.60	3.87	5.95	0.61				0.10		99.76	2.68
A3. III	1.046	.154	.013	.065	.040	.046	.063	.063					.001			
2	58.37	15.11	1.91	8.99	0.57	3.32	3.76	4.09	2.25		0.97	0.21	0.48		100.03	
A2. II	.973	.148	.012	.125	.014	.059	.061	.044			.012	.001	.007			
3	58.77	15.78	2.33	6.03	0.24	3.55	4.47	5.29	1.22	0.29	0.94	1.45	0.10		100.46	2.72
A2. II	.980	.155	.015	.083	.006	.064	.073	.058			.012	.010	.001			
4	62.85	16.80	2.96	2.89	1.48	3.24	4.09	5.49	0.24	0.13	0.09	0.13	0.21	F S BaO 0.01 0.02 0.06	100.69	
A1. I	1.048	.165	.019	.040	.037	.058	.066	.059			.001	.001	.003			
5	62.34	17.22	1.75	2.49	1.30	3.28	5.28	5.14	0.28		0.60	trace	trace	SO ₃ trace	99.68	2.68
A3. III	1.039	.169	.011	.035	.033	.059	.085	.054			.008	—	—			
6	60.56	16.19	5.19	2.41	1.30	2.09	4.78	4.82	0.51		1.19	0.30	0.36		99.70	2.633
A2. II	1.009	.159	.032	.033	.033	.037	.077	.051			.015	.002	.005			
7	61.65	15.07	2.03	2.25	3.67	4.61	4.35	4.50	0.41	0.26	0.56	0.33	0.09	Cr ₂ O ₃ trace BaO 0.27 SrO 0.10 Li ₂ O trace	100.15	
A1. I	1.028	.148	.013	.031	.092	.083	.070	.048			.007	.002	.001			
8	54.42	14.28	3.32	4.13	6.12	7.72	3.44	4.22	0.38	0.22	0.80	0.59	0.10	Cr ₂ O ₃ trace BaO 0.32 SrO 0.13 Li ₂ O trace	100.19	
A1. I	.907	.140	.021	.059	.153	.138	.055	.045			.010	.004	.001			
9	52.26	13.96	2.76	4.45	8.21	7.06	2.80	3.87	1.34	1.53	0.58	0.52	0.14	CO ₂ 0.49 Cr ₂ O ₃ trace BaO 0.23 SrO 0.05 Li ₂ O trace	100.25	
A1. I	.871	.137	.017	.062	.205	.126	.045	.041			.007	.004	.002			
10	55.23	18.31	4.90	2.06	1.85	3.62	4.02	6.43	1.84		0.42	0.58	trace	CO ₂ none SO ₃ 0.23 Cl 0.32 BaO 0.46 SrO trace	100.27	
A1. I	.921	.179	.031	.029	.046	.064	.065	.068			.005	.004	—			
11	52.81	15.66	3.06	4.76	4.99	7.57	3.60	4.84	0.93	0.16	0.71	0.75	trace	SO ₃ trace Cl 0.07 F trace BaO 0.24 SrO 0.06 Li ₂ O trace	100.24	
A1. I	.880	.152	.019	.066	.125	.135	.058	.051			.009	.005	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

RANG 2. DOPOTASSIC. CIMINOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	II''5(6).2.2.	or 42.81 di 21.97 ab 2.10 ol 5.69 an 13.34 mt 3.25 ne 7.67 il 2.28 ap 0.67	San Martino, Vico Volcano, n. Viterbo, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 72, 1906.	Leucite tephrite.	
11	''II.5.(1)2.''2.	Q 3.36 hy 2.80 or 54.49 mt 11.60 ab 11.00 hm 2.56 an 5.84 C 5.30	Atatsch Mountain, South Ural Mountains, Russia.	J. Morozewicz.	J. Morozewicz, Mem. Com. G. Russ., XVIII, No. 1, p. 18, 1901.	Atatschite breccia.	Also in T. M. P. M., XXIII, p. 137, 1904.
12	II''5''2.2.	or 48.93 di 13.18 ab 4.72 ol 6.51 an 7.78 mt 6.96 ne 5.11 il 1.52 hm 2.08 ap 1.34	Gaussberg, Kaiser Wilhelm II Land, Antarctica.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II, (1), p. 81, 1906.	Leucite basalt.	

SUBRANG 3. SODIPOTASSIC. MONZONOSE. (C. I. P. W., 1902.)

1	''II.''5.''2.3.	Q 7.44 di 4.21 or 35.03 hy 8.74 ab 33.01 mt 3.02 an 7.78	Rigaud Mountain, Quebec.	O. E. Le Roy.	O. E. Le Roy, B. G. S. A., XII, p. 386, 1901.	Hornblende syenite.	
2	II.''5.2.3''.	Q 6.72 di 3.16 or 24.46 hy 14.00 ab 31.96 mt 2.78 an 11.95 il 1.82 ap 0.34	Peninsula, Port Coldwell, Ontario.	F. H. Genth.	H. L. Kerr, Rep. Bur. Min. Ont., XIX (1), p. 220, 1910.	Laurvikite.	
3	''II.5.''2.3''.	Q 5.22 di 1.24 or 31.14 hy 7.33 ab 38.25 mt 3.48 an 7.23 il 1.82 ap 3.36	Pine Hill, West Quincy, Massachusetts.	C. H. Warren.	C. H. Warren, Pr. Am. Ac., XLIX, p. 271, 1913.	Rhomben porphyry.	
4	(I)II.(4)5.2.3.	Q 8.58 di 3.43 or 32.80 hy 5.04 ab 34.58 mt 4.41 an 11.12 il 0.15 ap 0.34	Long Lake, Adirondack Mountains, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus., A. R., LX (2), p. 521, 1907.	Syenite.	
5	(I)II.5.''2.3(4).	Q 4.02 di 6.55 or 30.02 hy 2.22 ab 44.54 mt 2.55 an 8.34 il 1.22	Pendleton, Oconee County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S. (IV), B. 2, p. 178, 1908.	Granite.	
6	(I)II.(4)5.2.3(4).	Q 8.88 hy 3.30 or 28.36 mt 5.34 ab 40.35 il 2.28 an 8.34 hm 1.44 C 0.10 ap 0.67	Near Willard, Elliott County, Kentucky.	T. M. Chatard.	J. S. Diller, A. J. S., XXXII, p. 125, 1886.	Syenite.	Also in U.S.G.S. B. 38, p. 24, 1887. In W. T., p. 255.
7	II.''5.2.3''.	Q 6.60 di 10.10 or 26.69 hy 6.02 ab 36.68 mt 3.02 an 8.34 il 1.06 ap 0.67	Yogo Peak, Little Belt Mountains, Montana.	W. F. Hille- brand.	Weed and Pirsson, A. J. S., L, p. 471, 1895.	Syenite.	Also in U.S.G.S. A. R. 20, III, p. 473, 1900. In W. T., p. 255.
8	II(III).5.2.3.	or 25.02 di 18.81 ab 28.82 hy 1.80 an 11.12 ol 5.98 mt 4.87 il 1.82 ap 1.34	Yogo Peak, Little Belt Mountains, Montana.	W. F. Hille- brand.	Weed and Pirsson, A. J. S., L, p. 473, 1895.	Monzonite ("yogoite").	Also in U.S.G.S. A. R. 20, III, p. 478, 1900. In W. T., p. 255.
9	II(III).5.2(3).3.	or 22.80 di 14.36 ab 23.58 hy 6.95 an 14.18 ol 8.59 mt 3.94 il 1.06 ap 1.01	Sheep Creek, Little Belt Mountains, Montana.	W. F. Hille- brand.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 531, 1900.	Augite minette.	In W. T., p. 255.
10	(I)II.5.2.3.	or 37.81 di 1.08 ab 34.06 hy 0.10 an 12.79 ol 2.80 mt 5.57 il 0.76 hm 1.12 ap 1.34	Aspen Creek, Highwood Mountains, Montana.	H. W. Foote.	L. V. Pirsson, U. S. G. S. B. 237, p. 134, 1905.	Gauteite.	In W. T., p. 255.
11	II(III).5.2.3.	or 28.36 di 16.74 ab 23.32 ol 6.83 an 11.95 mt 4.41 ne 3.83 il 1.37 ap 1.68	Beaver Creek, Bearpaw Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., I, p. 357, 1896.	Monzonite.	In W. T., p. 255.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
12	58.53	16.85	3.49	2.37	1.46	3.93	4.05	7.12	0.49	0.12	0.71	0.24	0.19	SO ₃ 0.04 BaO 0.10 SrO 0.14	99.83	
A1. I	.976	.165	.022	.033	.037	.070	.066	.076			.009	.002	.003			
13	51.65	13.89	2.70	4.80	11.56	4.07	2.99	4.15	1.89	1.30	0.55	0.21	0.15	SO ₃ 0.19 Cr ₂ O ₃ 0.08 BaO 0.19	100.37	
A1. I	.861	.136	.017	.067	.289	.073	.048	.044			.007	.001	.002			
14	57.29	18.45	4.38	1.20	2.08	3.57	4.43	5.43	2.01	0.17	0.72	0.46	trace	NiO 0.12	100.31	
A2. II	.955	.181	.027	.017	.052	.064	.071	.058			.009	.003	—			
15	52.33	18.70	4.95	1.83	2.69	4.71	4.51	5.45	2.71	0.74	0.71	0.81	0.03	NiO 0.14	100.31	
A2. II	.872	.183	.031	.025	.067	.084	.072	.059			.009	.006	—			
16	52.63	16.87	4.52	3.11	3.69	4.77	3.86	5.17	3.65		0.81	0.63	0.10	BaO 0.29	100.10	
A2. II	.877	.164	.028	.043	.092	.086	.062	.056			.010	.004	.001			
17	51.82	16.75	4.56	3.36	4.03	4.94	3.91	5.02	3.97		0.71	0.52	0.23	BaO 0.26	100.08	
A2. II	.864	.164	.029	.047	.101	.088	.063	.054			.009	.004	.003			
18	52.10	16.34	3.84	6.82	4.33	4.73	4.02	4.20	1.74		0.79	0.68	trace	SO ₃ 0.22 Cl 0.24 Li ₂ O 0.13	100.18	
A2. II	.868	.160	.024	.094	.108	.084	.065	.045			.010	.005	—			
19	51.46	18.32	4.61	2.71	2.91	6.03	4.11	4.48	3.89		0.83	0.86	0.17		100.38	
A2. II	.858	.180	.029	.038	.073	.108	.066	.048			.010	.006	.002			
20	59.79	17.25	3.60	1.59	1.24	3.77	5.04	5.05	0.39	0.19	0.67	0.35	0.20	CO ₂ 0.72 SO ₃ 0.04 Cl trace BaO 0.14 SrO 0.11 Li ₂ O trace	100.14	2.704
A1. I	.997	.170	.023	.022	.031	.068	.081	.055			.008	.002	.003			25°
21	57.48	18.04	5.73	0.73	1.17	5.03	4.28	4.15	0.55	0.62	1.00	0.66	trace	ZrO ₂ 0.04 SO ₃ 0.16 V ₂ O ₅ 0.02 BaO 0.20 SrO 0.12	99.96	
A1. I	.958	.176	.035	.010	.029	.089	.069	.044			.012	.005	—			
22	59.35	16.36	2.90	3.36	3.08	5.03	3.73	3.85	0.64	0.28	0.87	0.44	0.07	ZrO ₂ 0.03 SO ₃ none Cl 0.05 FeS ₂ 0.02 Cr ₂ O ₃ none BaO 0.16 SrO 0.05 Li ₂ O trace CuO 0.01 ZnO 0.01	100.29	
A1. I	.989	.160	.018	.047	.077	.089	.060	.041			.011	.003	.001			
23	57.16	16.69	3.47	2.76	2.47	5.86	3.82	4.49	1.06	0.83	0.87	0.41	trace	CO ₂ none S 0.02 Cr ₂ O ₃ trace BaO 0.30	100.21	
A1. I	.953	.164	.022	.039	.062	.105	.061	.048			.011	.003	—			
24	61.12	15.78	2.69	3.15	1.90	3.95	4.14	4.48	0.56	0.32	1.30	0.45	0.09	CO ₂ 0.22 ZrO ₂ 0.04 S 0.05 BaO 0.07 SrO 0.04	100.35	
A1. I	1.019	.155	.017	.044	.048	.071	.067	.048			.016	.003	.001			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODI POTASSIC. MONZONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
12	"II.5.(1)2.3.	or 42.26 di 8.80 ab 33.01 ol 0.14 an 6.39 mt 5.10 ne 0.85 il 1.37 ap 0.67	Bradyville, Coeur d'Alene District, Idaho.	G. Steiger.	Ransome and Calkins, U. S. G. S. P. P. 62, p. 47, 1908.	Syenite.	
13	II(III).5.2''.3.	or 24.46 di 5.68 ab 25.15 hy 3.13 an 12.23 ol 20.71 mt 3.94 il 1.06 ap 0.34	Cottonwood Creek, Montana.	T. M. Chatard.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 670, 1895.	Lamprophyre.	In W. T., p. 255.
14	(I)II.5.2.3.	Q 1.38 di 0.43 or 32.25 hy 5.00 ab 37.20 mt 1.86 an 14.46 il 1.37 hm 3.04 ap 1.01	Stinkingwater River, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, J. G., III, p. 947, 1895.	Quartz banakite.	Also in U. S. G. S. Mon. 32 (II), p. 349, 1899. In W. T., p. 255.
15	"II.5.2.3.	or 32.80 di 2.59 ab 28.56 ol 3.85 an 14.46 mt 3.71 ne 4.97 il 1.37 hm 2.40 ap 2.02	Stinkingwater River, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, J. G., III, p. 947, 1895.	Banakite.	Also in U. S. G. S. Mon. 32 (II), p. 349, 1899. In W. T., p. 257.
16	II.5.2.3.⊙	or 31.14 di 5.96 ab 30.39 ol 6.07 an 12.79 mt 6.50 ne 1.14 il 1.52 ap 1.34	Hoodoo Mountain, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 927, 1895.	Banakite.	Also in U. S. G. S. Mon. 32 (II), p. 347, 1899. In W. T., p. 257.
17	II.5.2.3.⊙	or 30.02 di 6.80 ab 28.30 ol 6.03 an 13.07 mt 6.73 ne 2.56 il 1.37 ap 1.01	Lamar River, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 947, 1895.	Banakite.	Also in U. S. G. S. Mon. 32 (II), p. 349, 1899. In W. T., p. 257.
18	II.5.2.3''.	or 25.02 di 3.86 ab 34.06 ol 12.30 an 13.90 mt 5.57 il 1.52 ap 1.68	Indian Creek Laccolith, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 83, 1899.	Andesite porphyry.	Upper part of sheet. Cf. No. 4, III.5.3.3. In W. T., p. 257.
19	II.5.2(3).3.	or 26.69 di 4.75 ab 30.92 ol 3.67 an 18.35 mt 6.73 ne 1.99 il 1.52 ap 2.02	Ishawooa Canyon, Wyoming.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 947, 1895.	Banakite.	Also in U. S. G. S. Mon. 32 (II), p. 349, 1899. In W. T., p. 257.
20	(I)II.5.2.3(4).	Q 3.30 di 5.83 or 30.58 hy 0.40 ab 42.44 mt 3.94 an 9.45 il 1.22 hm 0.91 ap 0.67	Near Tirbircio Gulch, La Plata Mountains, Colorado.	H. N. Stokes.	W. Cross, U. S. G. S. Fol. 60, p. 6, 1899.	Syenite.	Fresh? In W. T., p. 257.
21	(I)II."5.2(3).3(4).	Q 6.96 di 1.51 or 24.46 hy 2.20 ab 36.16 il 1.52 an 17.51 hm 5.73 tn 0.39 ap 1.68	Wicher Mountain, Pikes Peak, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. B. 148, p. 163, 1897.	Pyroxene latite.	In W. T., p. 257.
22	II.(4)5.2(3).3''.	Q 8.94 di 4.45 or 22.80 hy 8.08 ab 31.44 mt 4.18 an 16.40 il 1.67 ap 1.01	Clayton Peak, Park City quad- rangle, Utah.	W. F. Hillebrand.	J. M. Boutwell, U. S. G. S. P. P. 77, p. 79, 1912.	Quartz diorite.	
23	II.5.2''.3.	Q 4.86 di 8.77 or 26.69 hy 2.86 ab 31.96 mt 5.10 an 15.29 il 1.67 ap 1.01	Telegraph Mine, Bingham, Utah.	E. T. Allen.	J. M. Boutwell, U. S. G. S. P. P. 38, p. 178, 1905.	Porphyry.	
24	"II.(4)5.2.3''.	Q 10.08 di 4.67 or 26.69 hy 4.16 ab 35.11 mt 3.94 an 11.12 il 2.43 ap 1.01	Organ City, Organ Mountains, New Mexico.	G. Steiger.	Lindgren, Graton and Gordon, U. S. G. S. P. P. 68, p. 68, 1910.	Quartz syenite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
25	55.35	12.91	4.67	2.06	6.29	5.77	2.65	4.86	1.18	2.67	0.87	0.58	0.08	NiO 0.05 BaO 0.19 SrO trace Li ₂ O trace	99.98	
A1. I	.923	.126	.029	.029	.157	.103	.043	.052			.011	.004	.001			
26	57.48	14.09	5.21	1.35	3.49	6.05	3.00	4.69	1.37	1.20	0.94	0.65	0.09	NiO 0.08 BaO 0.23 SrO trace Li ₂ O none	99.92	
A1. I	.958	.138	.033	.019	.087	.108	.048	.050			.012	.005	.001			
27	57.04	13.66	4.96	1.77	4.43	6.23	3.08	4.95	1.10	1.11	0.94	0.63	0.17	NiO 0.07 BaO 0.22 SrO trace Li ₂ O trace	100.36	
A1. I	.951	.134	.031	.025	.111	.111	.050	.053			.012	.004	.002			
28	60.51	16.71	1.72	3.34	2.53	3.62	4.64	5.20	0.27	0.03	0.60	0.16	0.10	BaO 0.10 SrO 0.12	99.65	2.667
A2. II	1.009	.164	.009	.046	.063	.064	.075	.055			.008	.001	.001			
29	54.54	18.10	1.14	4.63	4.56	5.85	3.38	5.44	0.50	0.10	0.96	0.46	0.10	BaO 0.21 SrO 0.15	100.12	2.745
A2. II	.909	.177	.007	.064	.114	.105	.055	.057			.024	.003	.001			
30	53.68	16.89	1.28	5.53	3.70	6.08	4.03	4.32	1.85	0.10	0.90	1.05	0.11	BaO 0.38 SrO 0.10	100.00	2.723
A2. II	.895	.166	.008	.076	.093	.109	.065	.045			.011	.007	.002			
31	52.95	14.00	2.57	5.55	7.29	6.93	2.73	5.09	0.50	0.16	0.70	0.47	0.13	BaO 0.32 SrO 0.11	99.50	2.872
A2. II	.883	.137	.016	.077	.182	.123	.044	.054			.009	.003	.002			
32	52.43	19.18	3.51	2.08	2.61	3.71	4.85	5.95	3.19	0.27	0.86	0.42	trace	BaO 0.35 SrO 0.42	99.83	
A2. II	.874	.188	.022	.029	.065	.066	.078	.064			.011	.003				
33	52.38	15.29	2.99	5.53	5.84	7.30	3.63	3.84	0.63	0.21	1.10	0.75	0.10	BaO 0.25 SrO 0.15	100.04	2.847
A2. II	.873	.150	.019	.076	.146	.130	.060	.041			.014	.005	.001			
34	57.32	17.27	1.62	3.94	2.68	4.24	4.52	5.96	0.47	0.08	0.88	0.51	0.00	BaO 0.24 SrO 0.06	99.88	
A1. I	.955	.169	.010	.055	.048	.076	.073	.064			.011	.004	.001			
35	55.90	15.52	1.22	5.22	4.70	5.79	2.89	4.45	1.40	0.60	0.90	0.46	0.08	CO ₂ 0.14 SrO 0.09	99.36	
A2. II	.932	.152	.008	.072	.118	.104	.047	.048			.011	.003	.001			
36	54.49	16.51	2.79	5.20	3.55	7.06	3.50	4.36	1.18	0.07	0.70	0.20	0.10	CO ₂ 0.10 S 0.23	100.04	
A2. II	.908	.162	.018	.072	.089	.126	.056	.046			.009	.001	.001			
37	59.43	16.68	2.54	3.48	1.84	4.09	3.72	5.04	0.72	0.27	1.38	0.58	trace	ZrO ₂ 0.08 BaO 0.14 SrO trace Li ₂ O none	100.04	2.61
A1. I	.991	.164	.015	.049	.046	.073	.060	.053			.017	.004	—			
38	58.18	18.46	2.31	3.79	1.99	3.11	3.70	6.58	0.64		0.68	0.41		BaO 0.29	100.14	2.777
A2. II	.970	.181	.014	.053	.050	.055	.060	.070			.009	.003				
39	58.22	19.60	0.59	5.19	1.02	3.37	3.64	5.83	0.84	0.14	0.96	0.58	0.19	S NiO BaO Li ₂ O	100.21	
A1. I	.970	.192	.004	.072	.026	.061	.059	.062			.012	.004	.003			

ORDER 5. PERFELIC. GERMANARE—Continued.

SURANG 3. SODIPOPASSIC. MONZONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
25	II''/5.2.3.	Q 4.50 di 12.74 or 28.91 hy 9.80 ab 22.53 mt 4.41 an 8.62 il 1.67 hm 1.60 ap 1.34	Santa Maria Basin, Arizona.	W. F. Hille- brand.	J. P. Iddings, B. Phil. Soc. Wash., XII, p. 212, 1892.	Mica basalt.	In W. T., p. 257.
26	II.(4)5.2.3.	Q 9.12 di 11.02 or 27.80 hy 3.60 ab 25.15 mt 1.86 an 11.12 il 1.82 hm 4.00 ap 1.68	Santa Maria Basin, Arizona.	W. F. Hille- brand.	J. P. Iddings, B. Phil. Soc. Wash., XII, p. 212, 1892.	Mica basalt.	In W. T., p. 257.
27	II''/5.2.3.	Q 5.46 di 14.04 or 29.47 hy 4.60 ab 26.20 mt 3.48 an 9.17 il 1.82 hm 2.56 ap 1.34	Santa Maria Basin, Arizona.	W. F. Hille- brand.	J. P. Iddings, B. Phil. Soc. Wash., XII, p. 212, 1892.	Mica basalt.	In W. T., p. 257.
28	''II.5.2.3''.	Q 2.34 di 5.85 or 30.58 hy 7.54 ab 39.30 mt 2.09 an 9.45 il 1.22 ap 0.34	Monument 169, Rossland Moun- tains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 364, 1912.	Syenite porphyry.	
29	II.5.2''3.	or 31.69 di 8.93 ab 27.77 ol 8.36 an 15.29 mt 1.62 ne 0.57 il 3.65 ap 1.01	Stony Creek, Rossland Moun- tains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 325, 1912.	Augite latite.	
30	II.5.2''3''.	or 25.58 di 7.76 ab 32.49 ol 10.43 an 15.29 mt 1.86 ne 0.85 il 1.67 ap 2.35	Columbia River, Rossland Moun- tains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 310, 1912.	Hornblende minette.	
31	II(III).5.2.3.	or 30.02 di 17.00 ab 20.96 ol 12.35 an 10.84 mt 3.71 ne 1.14 il 1.37 ap 1.01	Christina Lake, Rossland Moun- tains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 357, 1912.	Olivine syenite.	
32	(I)II.5(6).2.3.	or 35.58 di 3.46 ab 24.10 ol 3.43 an 12.79 mt 4.18 ne 9.09 il 1.67 hm 0.64 ap 1.01	Rock Creek Cho- nolith, Midway Mountains, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 409, 1912.	Rhomben porphyry.	Border of mass. Of. No. 6, II.6.2.3.
33	II''5.2''3''.	or 22.80 di 17.43 ab 24.63 ol 8.67 an 13.62 mt 4.41 ne 3.69 il 2.13 ap 0.34	Coryell Batholith, West Kootenai District, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 361, 1912.	Monzonite.	
34	''II.5.2.3.	or 35.58 di 7.12 ab 35.63 ol 4.34 an 8.90 mt 2.32 ne 1.42 il 1.67 ap 1.34	Phoenix, British Columbia.	M. F. Connor.	O. E. Le Roy, Can. G. S. Mem. 21, p. 51, 1912.	Pulaskite porphyry.	
35	II.5.2(3).3.	Q 2.34 di 8.31 or 26.69 hy 14.84 ab 24.63 mt 1.86 an 15.85 il 1.67 ap 1.01	Phoenix, British Columbia.	M. F. Connor.	O. E. Le Roy, Can. G. S. Mem. 19, p. 28, 1913.	Augite porphyrite.	
36	II.5.2(3).3.	or 25.58 di 14.28 ab 29.34 hy 3.12 an 16.68 ol 3.56 mt 4.18 il 1.37 ap 0.34	Le Roi Mine, Rossland, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38, (1), p. 343, 1912.	Monzonite.	
37	(I)II.(4)5.2.3.	Q 8.34 di 2.00 or 29.47 hy 5.88 ab 31.44 mt 3.48 an 14.18 il 2.58 ap 1.34	Dardanelle Flow, Tuolumne County, California.	H. N. Stokes.	F. L. Ransome, U. S. G. S. B. 89, p. 58, 1898.	Augite latite.	Also in A. J. S., V, p. 58, 1898. In W. T., p. 257.
38	(I)II.5.2.3.	Q 1.20 hy 8.96 or 38.92 mt 3.25 ab 31.44 il 1.37 an 12.51 ap 1.01 C 0.61	Tito, Coquimbo, Chile.	A. Lindner.	F. v. Wolff, Z. D. G. G., LI, p. 531, 1899.	Odinite.	In W. T., p. 257.
39	(I)II.5.2.3.	Q 3.78 hy 10.39 or 34.47 mt 0.93 ab 30.92 il 1.82 an 13.34 ap 1.34 C 2.35	Ordiquihill, n. Huntley, Aberdeenshire, Scotland.	E. G. Radley.	J. J. H. Teall, G. S. G. Br., Sum. Prog. (1913), p. 83, 1914.	Quartz monzonite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
40	56.4	19.0	3.5	4.8	1.5	2.6	4.5	5.0	2.6						99.9	
B3. IV	.940	.186	.022	.067	.038	.046	.073	.053								
41	52.85	16.55	4.12	2.22	3.01	6.20	4.27	4.25	1.54	0.23	2.30	1.07		SO ₃ trace Cl 0.77	99.38	
B2. III	.881	.162	.026	.031	.075	.111	.069	.046			.029	.008				
42	50.98	16.13	4.20	3.24	7.28	5.50	2.99	4.82	1.46	0.44	1.25	0.74	0.17	CO ₂ 0.58 Cl 0.07 FeS ₂ 0.43 Cr ₂ O ₃ trace V ₂ O ₅ trace NiO trace BaO 0.20 SrO trace	100.48	
A1. I	.850	.158	.026	.045	.182	.098	.048	.052			.016	.005	.002			
43	58.00	16.91	3.29	3.74	1.96	3.60	5.14	5.20	0.60		0.85		0.80		100.09	
A2. II	.967	.166	.021	.052	.049	.064	.083	.055			.011		.011			
44	57.38	17.93	6.05	0.75	1.91	5.14	4.38	6.38	n. d.		0.26	0.18			100.36	
A2. II	.956	.176	.038	.010	.048	.092	.071	.068			.003	.001				
45	58.41	17.01	3.44	2.61	2.95	4.29	4.39	4.23	1.59		0.98	0.40		CO ₂ 0.29 SO ₃ 0.11	100.70	2.729
A2. II	.974	.167	.022	.036	.074	.077	.071	.045			.012	.003				
46	59.86	16.68	2.79	3.00	3.51	3.96	3.58	4.30	1.44		0.75				99.87	
A3. III	.981	.164	.018	.042	.088	.071	.058	.046			.010					
47	59.52	13.65	0.21	5.33	5.11	5.12	2.58	6.26	1.66		trace	0.22	0.96		100.62	2.764
A2. II	.992	.134	.001	.074	.128	.091	.042	.067			—	.002	.013			
48	58.69	13.91	2.41	3.94	6.63	3.41	2.62	4.53	2.69		0.83	0.30			99.96	
A2. II	.978	.136	.015	.055	.166	.061	.042	.048			.010	.002				
49	57.76	17.03	2.05	2.39	2.27	4.16	4.24	7.13	0.62	0.42	1.08	0.47			99.62	2.68
A2. II	.963	.167	.013	.033	.057	.074	.068	.076			.014	.003				15°
50	52.53	17.11	6.96	1.70	2.10	3.10	3.58	7.85	2.48	0.41	1.92	trace	0.31	SO ₃ 0.41 Cl trace	100.46	2.661
A2. II	.876	.168	.044	.024	.053	.055	.058	.084			.024	—	.004			15°
51	54.64	17.13	6.79	1.17	3.00	3.28	4.43	6.29	2.00		1.47	0.42		SO ₃ 0.13	100.75	2.720
A2. II	.911	.168	.042	.017	.075	.059	.071	.067			.018	.003				
52	53.92	16.60	6.87	0.99	4.26	3.54	3.22	7.45	2.15		1.08	0.62			100.83	2.709
A2. II	.899	.163	.043	.014	.107	.063	.061	.080			.013	.004				
53	62.49	16.49	2.36	2.04	1.87	4.23	4.38	4.65	0.32	0.28	0.85	0.32		CO ₂ none ZrO ₂ none SO ₃ none BaO 0.15 SrO trace	100.48	
A1. I	1.042	.182	.015	.028	.047	.075	.071	.050			.011	.002				
54	58.70	17.09	3.17	2.29	2.41	4.71	4.38	4.35	0.89	0.23	0.95	0.23		CO ₂ none	99.40	
A2. II	.978	.168	.020	.032	.060	.064	.071	.047			.012	.002				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBBRANG 3. SODIPOTASSIC. MONZONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
40	(I)II.5.2.3''.	Q 0.54 hy 9.74 or 29.47 mt 5.10 ab 38.25 an 12.79 C 1.43	Dunans, Cowal, Argyllshire, Scotland.	J. H. Player.	C. T. Clough, G. S. Scot. Mem. Cowal, p. 170, 1897.	Trachyte.	Not in W. T.
41	II.5.2''3''.	Q 2.40 di 5.62 or 25.58 hy 4.90 ab 30.39 mt 0.46 an 16.12 il 4.41 hl 1.29 hm 3.84 ap 2.69	Ledbeg, Assynt, Scotland.	A. Gemmell.	A. Gemmell, Tr. Edin. G. Soc., IX (5), p. 418, 1910.	Assyntite.	Augite-sodalite syenite.
42	II.5.2(3).3.	or 28.91 di 1.94 ab 25.15 hy 5.43 an 16.12 ol 8.81 mt 6.03 il 2.43 ap 1.68	Pentire, Newquay, Cornwall.	W. Pollard.	J. S. Flett, G. S. Eng. Mem. Sh. 346, p. 61, 1906.	Mica trap.	
43	''II.5.2.3(4).	or 30.58 di 8.23 ab 41.92 ol 3.62 an 7.78 mt 4.87 ne 0.85 il 1.67	Tuft, Lougendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., II, p. 33, 1895.	Akerite.	In W. T., p. 257.
44	''II.5.2.3.	or 37.81 di 10.37 ab 30.39 wo 0.46 an 10.23 mt 1.62 ne 3.69 il 0.46 hm 4.96 ap 0.34	Remscheid, Siebengebirge.	Greiffenberg (student).	H. Lasheyres, D. Siebengebirge, p. 320, 1901.	Trachyte.	Cf. No. 11, II.5.1.3.
45	''II.5.2.3(4).	Q 5.04 di 3.46 hy 6.06 ab 37.20 mt 5.10 an 14.18 il 1.82 ap 1.01	Nahethal, Rhenish Prussia.	Hampe.	H. Loretz, Jb. Pr. G. L.-A., IX, p. 300, 1889.	Porphyrite.	In W. T., p. 257.
46	''II.(4)5.2(3).3.	Q 7.44 di 2.44 or 25.58 hy 9.48 ab 30.39 mt 4.18 an 16.68 il 1.52	Büchereck, n. Farrenkopf, Baden.	M. Dittrich.	A. Sauer, Erl. G. Kt. Bad., Bl. Hornberg, p. 27, 1897.	Syenite.	In W. T., p. 259.
47	II''5.2.(2)3.	Q 0.24 di 13.73 or 37.25 hy 18.70 ab 22.01 mt 0.23 an 6.95 ap 0.67	Heuelgraben, Wehrathal, Schwarzwald.	O. H. Erd- mannsdoerfer.	O. H. Erdmannsdoer- fer, Mt. Bad. G. L.-A., IV (2), p. 183, 1901.	Minette.	
48	II.(4)5.2''3.	Q 8.46 di 2.00 or 26.69 hy 19.62 ab 22.01 mt 3.48 an 12.79 il 1.52 ap 0.67	Frohnau, n. Hausach, Baden.	M. Dittrich.	A. Sauer, Erl. G. Kt. Bad., Bl. Hornberg, p. 27, 1897.	Mica syenite.	In W. T., p. 259.
49	''II.5.(1)2.3.	or 42.26 di 8.96 ab 30.39 ol 1.63 an 6.39 mt 3.02 ne 2.84 il 2.13 ap 1.01	Michelsberg, Katzenbuckel, Odenwald.	W. Freuden- berg.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 277, 1907.	Augite syenite.	Inclusion in shonkinite.
50	II.5''.(1)2.(2)3.	or 46.70 di 6.26 ab 17.55 ol 1.68 an 7.23 mt 0.93 ne 6.96 il 3.65 hm 6.40	Michelsberg, Katzenbuckel, Odenwald.	W. Freuden- berg.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 277, 1907.	Syenite.	Border facies of shonkinite.
51	''II.5.2.3.	or 37.25 di 4.10 ab 31.44 ol 3.92 an 8.94 il 2.53 ne 3.12 hm 6.79 ap 1.01	Langewiesen, Ilmenau, Thuringia.	Fischer.	H. Loretz, Jb. Pr. G. L.-A., XIII, p. 135, (1892), 1893.	Porphyrite.	In W. T., p. 259.
52	II.5.2.(2)3.	or 44.48 di 1.73 ab 24.63 ol 6.93 an 8.90 mt 0.23 ne 1.14 il 3.02 hm 6.38	Langewiesen, Ilmenau, Thuringia.	Hesse.	H. Loretz, Jb. Pr. G. L.-A., XIII, p. 135, (1892), 1893.	Porphyrite.	In W. T., p. 259.
53	(I)II.(4)5.2.3''.	Q 9.48 di 5.86 or 27.80 hy 2.23 ab 37.20 il 1.67 an 11.40 ap 0.72	Plauen, n. Dresden, Saxony.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXII, p. 132, 1906.	Syenite.	
54	''II.5.2.3(4).	Q 4.98 di 5.83 or 26.13 hy 3.30 ab 37.20 mt 4.64 an 13.90 il 1.82 ap 0.67	Plauen, n. Dresden, Saxony.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXII, p. 132, 1906.	Syenite.	Not same speci- men as No. 53.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
55	55.35	16.71	3.34	6.31	2.04	3.70	3.29	5.69	3.26			trace	trace		99.69	2.74
A3. III	.923	.164	.021	.088	.051	.066	.053	.061				—	—			
56	50.10	17.41	4.56	9.45	2.16	2.49	3.82	6.01	2.56		0.17	0.57			99.30	
B2. III	.835	.171	.029	.132	.054	.045	.061	.064			.002	.004				
57	54.71	19.42	3.21	1.50	2.08	4.45	4.53	6.47	2.62		0.73	0.32	0.42	CO ₂ 0.53	100.99	
A2. II	.912	.190	.020	.021	.052	.080	.073	.069			.009	.002	.006			
58	58.12	14.62	2.56	4.70	5.94	4.34	3.11	4.67	1.50			0.63	0.08		100.32	
A2. II	.969	.143	.016	.065	.149	.078	.050	.050				.005	.001			
59	56.27	16.24	4.31	2.31	2.61	6.27	4.07	4.61	1.73		0.83	0.19		CO ₂ 0.35	99.84	2.65
A2. II	.938	.159	.027	.032	.065	.113	.066	.049			.010	.001				
60	55.05	16.32	4.02	2.46	2.72	6.48	3.88	4.55	2.60		0.96	0.38	trace	CO ₂ trace	99.42	2.91
A2. II	.918	.160	.025	.031	.068	.116	.063	.049			.012	.003	—			
61	58.38	16.24	1.63	4.85	2.41	4.57	3.98	5.36	0.89		1.01	0.20	0.18	ZrO ₂ 0.38	100.08	
A2. II	.973	.159	.010	.068	.060	.082	.065	.057			.013	.001	.003			
62	55.52	17.98	3.82	3.74	1.90	5.28	3.86	5.90	0.77		0.81	0.34	0.10		100.02	
A2. II	.925	.176	.024	.051	.048	.095	.063	.063			.010	.002	.001			
63	54.20	15.73	3.67	5.40	3.40	8.50	3.07	4.42	0.50		0.40	0.50	0.70		100.50	
A2. II	.903	.154	.023	.075	.085	.151	.050	.047			.005	.004	.010			
64	52.64	14.96	4.44	5.63	3.92	7.82	3.82	3.98	1.17		1.10	0.27	0.22		99.97	
A2. II	.877	.147	.028	.078	.098	.139	.061	.043			.014	.002	.003			
65	62.55	13.73	0.89	3.55	4.34	3.86	3.38	5.53	1.10		1.01				99.94	2.74
A3. III	1.043	.135	.006	.050	.100	.069	.055	.059			.013					
66	61.82	15.31	1.21	2.47	4.12	3.85	3.71	4.75	1.72	0.11	0.70				99.77	2.74
A3. III	1.030	.150	.008	.035	.103	.069	.060	.051			.009					
67	56.97	13.51	1.78	4.38	6.04	5.72	3.54	4.44	2.08	0.10	1.06				99.62	2.78
A3. III	.950	.132	.011	.061	.151	.102	.057	.047			.013					
68	56.95	13.08	2.56	1.40	3.03	4.61	4.58	5.73	0.74	0.15	1.30	0.80			99.81	2.75
A2. II	.949	.177	.015	.019	.076	.082	.074	.061			.016	.006				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODI POTASSIC. MONZONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
55	II.5.2.3.⊙	Q 0.30 di 3.75 or 33.92 hy 12.06 ab 27.77 mt 4.87 an 13.90	Neudeck, Silesia.	H. Traube.	H. Traube, N. J., 1890, I, p. 225.	Mica syenite.	In W. T., p. 259.
56	II.5.2.3.⊙	or 35.58 ol 14.08 ab 25.68 mt 6.73 an 8.90 il 0.30 ne 3.41 ap 1.34 C 1.43	Striegau, Silesia.	F. Riegner.	F. Riegner, In Diss. Bres., p. 33, 1909.	Schlieren in granite.	Cf. No. 182, I.4.1.3. and No. 270, I.4.2.3.
57	(I)II.5''.2.3.	or 38.36 di 5.40 ab 25.15 ol 3.32 an 13.34 mt 4.18 ne 7.10 il 1.37 hm 0.32 ap 0.67	Pihlberg, Polzen District, North Bohemia.	K. H. Scheu- mann.	K. H. Scheumann, Abh. Säch. Ges. W., XXXII, p. 757, 1913.	Gauteite.	
58	II.5.2.3.⊙	Q 3.96 di 4.05 or 27.80 hy 19.54 ab 26.20 mt 3.71 an 11.95 ap 1.68	Rzikoin, Moravia, Austria.	C. v. John.	V. John and Suess, Jb. G. R.-A., Wien, LVIII, p. 262, 1908.	Granitite.	
59	II. 5.2.3''.	Q 1.80 di 14.04 or 27.24 mt 5.10 ab 34.58 il 1.52 an 12.23 hm 0.80 ap 0.34	Verdnik, Fruska Gora, Hungary.	B. Mauritz.	B. Mauritz, F. K., XLIII, p. 368, 1913.	Trachyte.	
60	II.5.2.3''.	Q 1.44 di 12.53 or 27.24 hy 1.00 ab 33.01 mt 5.10 an 13.34 il 1.82 hm 0.48 ap 1.01	Ledincze, Fruska Gora, Hungary.	B. Mauritz.	B. Mauritz, F. K., XLIII, p. 369, 1913.	Trachyte.	
61	II.5.2.3.⊙	Q 1.02 di 9.68 or 31.69 hy 7.53 ab 34.06 mt 2.32 an 10.29 il 1.98 ap 0.34	Val Caligore, Monte Mulatto, Predazzo, Tyrol.	M. Dittrich.	J. Romberg, Anh. Abh. Pr. Ak. W., 1904, p. 46.	Quartz monzonite.	
62	''II.5.2.3.	or 35.03 di 8.53 ab 30.39 ol 2.22 an 13.90 mt 5.57 ne 1.42 il 1.52 ap 0.67	La Forcella, Predazzo, Tyrol.	M. Dittrich.	J. Romberg, Anh. Abh. Pr. Ak. W., 1904, p. 78.	Gauteite.	
63	II''5.2(3).3.	or 26.13 di 18.56 ab 26.20 hy 3.28 an 15.85 ol 2.62 mt 5.34 il 0.76 ap 1.34	Monzoni, Tyrol.	V. Schmelck.	W. C. Brögger, Eg. K., II, p. 24, 1895.	Monzonite.	In W. T., p. 259.
64	II''5.2.''3.	or 23.91 di 20.02 ab 27.25 ol 3.81 an 11.95 mt 6.50 ne 2.56 il 2.13 ap 0.67	Monte Mulatto, Predazzo, Tyrol.	M. Dittrich.	J. Romberg, Anh. Abh. Pr. Ak. W., 1904, p. 31.	Monzonite.	
65	II.(4)5.(1)2.3.	Q 7.74 di 10.72 or 32.80 hy 9.84 ab 28.82 mt 1.39 an 5.84 il 1.98	Piz Tgietschen, Punteglia Dis- trict, Grau- bünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Granite- syenite.	
66	II.(4)5.2.3.	Q 8.10 di 6.61 or 28.36 hy 9.55 ab 31.44 mt 1.86 an 10.84 il 1.37	Piz Tgietschen, Punteglia Dis- trict, Grau- bünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Syenite porphyry.	
67	II''5.2.3.	Q 0.48 di 16.46 or 26.13 hy 12.10 ab 29.87 mt 2.55 an 7.78 il 1.98	Piz Tgietschen, Punteglia Dis- trict, Grau- bünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Diorite.	Dike.
68	(I)II.5.2.3.	or 33.92 di 4.32 ab 38.77 hy 1.40 an 11.68 ol 2.94 mt 0.70 il 2.43 hm 1.82 ap 1.92	Piz Tgietschen, Punteglia Dis- trict, Grau- bünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Biotite syenite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
69	51.48	16.24	2.69	4.70	7.97	4.41	3.25	5.75	2.32	0.20	0.82	0.40			100.23	2.84
A2. II	.858	.159	.017	.065	.199	.079	.053	.062			.010	.003				
70	58.24	16.14	3.45	2.92	3.28	4.58	4.18	4.03	1.75	0.20	1.31				100.08	2.82
A3. III	.971	.158	.022	.040	.082	.082	.068	.043			.016					
71	52.56	13.37	6.70	0.76	8.53	6.14	3.24	4.62	2.39	0.12	1.56				99.99	2.82
A3. III	.876	.131	.042	.011	.213	.109	.052	.049			.020					
72	54.98	14.10	2.27	4.24	5.74	6.76	3.79	3.94	1.92	0.05	1.32	0.72			99.83	2.81
A2. II	.916	.138	.014	.059	.144	.121	.061	.041			.017	.005				
73	53.10	15.52	2.07	6.11	6.87	5.73	3.57	3.63	2.40	0.10	1.26	0.24			100.60	2.85
A2. II	.885	.152	.013	.085	.172	.102	.068	.038			.016	.002				
74	54.42	12.84	3.04	6.92	3.90	6.33	3.38	5.00	2.03	0.16	2.74				100.72	2.91
A3. III	.907	.126	.019	.096	.098	.113	.055	.053			.034					
75	56.35	13.09	3.77	4.32	5.56	6.57	3.95	3.82	0.90	0.09	1.31				99.73	2.87
A3. III	.939	.128	.024	.060	.139	.118	.064	.040			.016					
76	52.77	16.15	3.85	5.27	7.14	2.20	3.93	5.43	1.51	0.21	1.21				99.67	2.76
A3. III	.880	.158	.024	.074	.179	.039	.063	.057			.015					
77	61.10	15.70	0.71	5.33	2.16	5.64	4.13	4.68	0.81						100.26	
A3. III	1.018	.154	.004	.074	.054	.101	.066	.050								
78	55.10	17.68	2.50	4.58	3.38	7.45	3.74	5.14	0.82						100.39	2.73
A3. III	.918	.173	.016	.064	.085	.133	.060	.054								
79	55.22	18.43	2.02	3.10	2.75	5.70	3.50	7.58	0.46	0.29	0.87	0.21		CO ₂ none ZrO ₂ 0.10 SO ₃ 0.11 BaO 0.07	100.41	
A1. I	.920	.181	.013	.043	.069	.102	.056	.081			.011	.002				
80	56.74	18.74	3.84	2.87	2.00	4.63	4.36	7.18	0.44				trace	Cl 0.22	101.02	
B3. IV	.946	.184	.024	.040	.050	.082	.070	.017					—			
81	56.27	18.67	5.74	1.58	1.44	4.47	4.65	5.03	1.77					Cl trace	99.62	
A3. III	.938	.183	.036	.022	.036	.080	.075	.053								
82	55.52	18.60	2.70	2.45	2.46	4.58	4.07	6.67	1.43	0.47	0.80	0.71	trace	Cl 0.33	100.79	
A2. II	.925	.182	.017	.034	.062	.082	.066	.071			.010	.005	—			
83	55.23	19.61	4.33	2.97	2.25	5.32	3.98	6.25	0.24					Cl 0.74	100.49	
A3. III	.921	.192	.027	.042	.046	.095	.065	.067								

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBBRANG 3. SODIPOTASSIC. MONZONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
69	II.5''2.3.	or 34.47 di 5.53 ab 17.82 ol 15.93 an 12.23 mt 3.94 ne 5.40 il 1.52 ap 1.01	Piz Tgietschen, Punteglia Dis- trict, Grau- bünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Augite porphyrite.	
70	II.''5.2.3(4).	Q 5.52 di 7.59 or 23.91 hy 4.93 ab 35.63 mt 5.10 an 13.07 il 2.43	Crap Grönd, Punteglia Dis- trict, Grau- bünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Diorite porphyry.	Center of dike, Cf. No. 83, II.5.2.4.
71	II(III).5.2.3.	or 27.24 di 15.12 ab 25.68 ol 10.01 an 8.34 il 1.67 ne 0.85 hm 6.70 pf 1.22	Crap Grönd, Punteglia Dis- trict, Grau- bünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Augite minette.	
72	II''5.2.3(4).	or 22.80 di 15.04 ab 31.96 hy 9.25 an 10.01 ol 1.22 mt 3.25 il 2.58 ap 1.68	Punteglia Glacier, Punteglia District, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Luciite?	Moraine block.
73	II''5.2(3).3(4).	or 21.13 di 8.74 ab 30.39 hy 5.28 an 15.57 ol 10.89 mt 3.02 il 2.43 ap 0.67	W. of Clavadi, Punteglia District, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Spessartite.	
74	II(III).5.''2.3.	or 29.47 di 21.45 ab 28.82 hy 2.19 an 5.00 ol 2.08 mt 4.41 il 5.17	Val Roseg, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Monzonitic syenite.	
75	II(III).5.2.3(4).	Q 0.84 di 20.68 or 22.24 hy 6.76 ab 33.54 mt 5.57 an 6.67 il 2.43	Lucendro Lake, St. Gotthard, Switzerland.	P. Waindziok.	P. Waindziok, In. Diss. Zür., p. 37, 1906.	Spessartite.	
76	II.5.2.3.⊙	or 31.69 di 0.22 ab 29.87 ol 16.03 an 10.56 mt 5.57 ne 1.70 il 2.28	Lucendro Lake, St. Gotthard, Switzerland.	P. Waindziok.	P. Waindziok, In. Diss. Zür., p. 35, 1906.	Minette- kersantite.	
77	II.5.2.3''.	Q 3.54 di 14.76 or 27.80 hy 7.19 ab 34.58 mt 0.93 an 10.56	Montecchio, n. Bagnala, Cimino Volcano, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	"Oligolab- radorite" (vulsinite).	
78	II.5.2''3.	or 30.02 di 16.84 ab 23.32 ol 4.80 an 16.40 mt 3.71 ne 4.40	Convento S. Angelo, Vico Volcano, n. Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Leucite tephrite.	
79	II.5(6).2.''3.	or 45.04 di 11.37 ab 14.93 ol 2.85 an 12.23 mt 3.02 ne 7.81 il 1.67 ap 0.67	Poggio Cavaliere, Vico Volcano, n. Viterbo, Italy.	H. S. Wash- ington.	H. S. Washington, R. C. R., p. 75, 1906.	Vulsinite.	
80	''II.5(6).2.3.	or 42.81 di 10.07 ab 22.01 ol 1.63 an 10.29 mt 5.57 ne 7.95	Concola, Fondo Riccio, Phlegrean Fields, Italy.	E. Manasse.	C. de Stefani, Pet. Mt. Ergh., No. 156, p. 162, 1907.	Trachyte.	Lapilli.
81	(I)II.5.2.''3.	or 29.47 di 5.40 ab 39.30 hy 0.90 an 15.29 ol 0.14 mt 5.10 hm 2.24	Concola, Fondo Riccio, Phlegrean Fields, Italy.	E. Manasse.	C. de Stefani, Pet. Mt. Ergh., No. 156, p. 162, 1907.	Trachyte.	Pumice.
82	(I)II.5.2.3.	or 39.48 di 4.38 ab 27.77 ol 3.59 an 12.51 mt 3.94 ne 3.69 il 1.52 ap 1.68	Santa Teresa Volcano, Phlegrean Fields, Italy.	F. S. Starrabba.	F. S. Starrabba, Att. Ac. Sc. Nap. (2), XIV, No. 7, p. 7, 1910.	Andesite.	Scoria from tuff.
83	''II.5.2.3.	or 37.25 di 7.85 ab 26.98 ol 2.01 an 16.68 mt 6.26 ne 0.99 hl 1.17	Mascaglione, Phlegrean Fields, Italy.	E. Manasse.	C. de Stefani, Pet. Mt. Ergh., No. 156, p. 162, 1907.	Trachyte.	Lapilli.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
84	54.72	19.60	2.45	3.09	1.90	5.00	3.52	6.87	2.08		0.65	trace		Cl 0.05	99.93	
A2. II	.912	.192	.015	.043	.048	.089	.056	.073			.008	—				
85	56.75	18.03	2.22	3.04	2.02	4.68	4.85	5.92	0.18		1.24	0.34	trace	Cl 0.11	99.38	
A2. II	.946	.177	.014	.042	.051	.084	.078	.063			.016	.002	—			
86	58.40	17.94	5.02	1.42	0.95	6.23	3.64	4.68	1.89		0.41	trace	0.40		100.98	
A2. II	.973	.176	.031	.019	.024	.111	.059	.050			.008	—	.006			
87	52.35	19.34	8.39	2.57	1.26	2.12	3.07	7.72	1.76				0.13	S 0.20 Insol. 0.33	99.24	
B3. IV	.873	.190	.053	.036	.032	.038	.050	.082					.002			
88	52.80	19.99	3.63	3.40	3.20	4.22	3.10	7.74	1.18		1.00	0.70			100.96	
A2. II	.880	.196	.023	.047	.080	.075	.050	.082			.013	.005				
89	59.64	17.09	2.45	3.21	1.66	3.88	3.52	5.88	1.24	0.43	0.42	0.47	0.21	CO ₂ 0.47 ZrO ₂ none SO ₃ none Cl trace Cr ₂ O ₃ none V ₂ O ₅ 0.01 NiO 0.04 BaO 0.10 SrO trace Li ₂ O trace CuO 0.01	100.73	2.698
A1. I	.994	.167	.015	.044	.041	.069	.057	.062			.005	.003	.003			
90	58.82	14.78	3.90	3.24	2.26	3.09	4.67	4.70	1.36	0.81	1.78	0.58	0.23	CO ₂ 0.05 ZrO ₂ none SO ₃ none Cl trace Cr ₂ O ₃ none V ₂ O ₅ 0.02 NiO 0.02 BaO 0.12 SrO trace Li ₂ O none Cu trace	100.43	2.707
A1. I	.980	.145	.024	.044	.056	.055	.076	.050			.023	.004	.003			
91	58.95	17.04	2.80	4.66	0.57	2.49	4.51	6.39	1.28	0.59	0.76	none	0.05	CO ₂ 0.06 ZrO ₂ 0.17 SO ₃ trace Cl trace F none NiO 0.01 BaO none SrO none	100.33	
A1. I	.983	.167	.018	.065	.014	.045	.073	.068			.010	—	—			
92	58.32	18.04	3.27	4.28	0.58	2.52	4.52	6.21	0.95	0.35	1.25		0.06	NiO trace BaO none SrO none	100.35	
A2. II	.972	.177	.020	.060	.015	.045	.073	.066			.016		.001			
93	51.07	17.52	4.10	5.40	2.27	5.44	3.31	5.53	2.50	1.02	0.80	0.88	0.03	CO ₂ 0.17 ZrO ₂ none SO ₃ none Cl trace Cr ₂ O ₃ none V ₂ O ₅ 0.07 NiO trace BaO 0.14 SrO trace Li ₂ O trace	100.25	2.698
A1. I	.851	.172	.026	.075	.057	.097	.053	.059			.010	.006	—			
94	54.50	17.81	1.70	5.30	1.09	2.64	5.39	6.08	3.78	0.54	0.44	0.44	0.25	CO ₂ 0.30 ZrO ₂ none SO ₃ 0.02 Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO none SrO none Cu trace	100.28	2.595
A1. I	.908	.175	.011	.074	.027	.047	.087	.065			.011	.003	.004			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODI POTASSIC. MONZONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
84	(I)II.5.2''/3.	or 40.59 di 5.88 ab 21.48 ol 3.32 an 17.51 mt 3.48 ne 4.26 il 1.22	Astroni Volcano, Phlegrean Fields, Italy.	C. Riva.	De Lorenzo and Riva, Att. Ac. Sci. Nap., XI, p. 37, 1902.	Vulsinite.	
85	II''5.2.3.	or 35.03 di 9.12 ab 32.49 ol 1.67 an 10.01 mt 3.25 ne 4.54 il 2.43 ap 0.81	L'Arso Flow, Ischia, n. Naples, Italy.	H. S. Wash- ington.	H. S. Washington, A. J. S., VIII, p. 290, 1899.	Vulsinite.	Complete in R. C. R., p. 75, 1906.
86	(I)II.''5.2''/3.	Q 7.02 di 5.18 or 27.80 wo 2.32 ab 30.92 mt 4.84 an 18.63 il 0.76 hm 1.76	Canigha, n. Alghero, Sardinia.	F. Millosevitch.	F. Millosevitch, Mem. Ac. Linc., VI, 14, p. 408, 1908.	Trachy- andesite.	
87	(I)II.5.2.(2)3.	or 45.59 ol 2.24 ab 24.63 mt 8.82 an 10.56 hm 2.28 ne 0.85 C 2.04	Atatsch Mountain, Southern Ural Mountains, Russia.	J. Morozewicz.	J. Morozewicz, Mem. Com. G. Rus., XVIII, No. 1, p. 18, 1901.	Atatschite (silliman- ite vitro- orthophyre)	Also in T. M. P. M., XXIII, p. 137, 1904.
88	''II.5.2.(2)3.	or 45.59 ol 6.72 ab 16.50 mt 5.34 an 16.12 il 1.98 ne 5.25 ap 1.68 C 0.61	Maros, Celebes.	Hinden.	C. Schmidt in Sarasin, Insel Celebes, IV, p. 25, 1901.	Monzonite- shonkinite.	
89	(I)II.(4)5.2.3.	Q 6.30 di 2.51 or 34.47 hy 6.44 ab 29.87 mt 3.48 an 13.34 il 0.76 ap 1.01	Berry Mountain, Cambewarra Flow, New South Wales.	Mingaye and White.	Card and Jaquet, Rec. G. S. N. S. W., VII, p. 111, 1902.	Augite trachyte.	
90	II.''5.(1)2.3(4).	Q 6.42 di 4.97 or 27.80 hy 3.35 ab 39.82 mt 4.87 an 5.28 il 3.50 hm 0.48 ap 1.34	Cambewarra Flow, n. Jamberoo, Kiama, New South Wales.	H. P. White.	Jaquet, Card and Harper, Rec. G. S. N. S. W., VIII, p. 18, 1905.	Augite trachyte.	
91	(I)II.5.(1)2.3.	Q 1.26 di 4.55 or 37.81 hy 3.94 ab 33.25 mt 4.18 an 7.23 il 1.52	Timor Ledges, Warrumbungle Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 616, 1907.	Trachy- andesite.	
92	(I)II.5.2.3.	Q 0.90 di 1.64 or 36.70 hy 3.97 ab 33.25 mt 4.64 an 10.56 il 2.43	Forked Mountain, Warrumbungle Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 616, 1907.	Trachy- andesite.	
93	II.5.2(3).3.	or 32.80 di 3.89 ab 25.68 ol 6.55 an 16.68 mt 6.03 ne 1.14 il 1.52 ap 2.02	Berkeley Flow, S. of Unanderra, Wollongong, New South Wales.	H. P. White.	G. W. Card, Rec. G. S. N. S. W., VIII, p. 262, 1907.	Orthoclase basalt.	
94	(I)II.5(6).(1)2.3''	or 36.14 di 3.10 ab 30.92 ol 6.40 an 6.39 mt 2.55 ne 7.95 il 1.67 ap 1.01	Yarrawa Parish, New South Wales.	W. A. Greig.	N. S. W. Dep. Min., A. R. (1912), p. 198, 1913.	Nephelite syenite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
95	53.80	15.79	4.40	3.69	3.44	6.34	3.71	4.25	1.93	0.87	0.85	0.81	0.07	CO ₂ 0.10 SO ₃ none Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ 0.02 NiO none BaO 0.02 SrO trace Cu none	100.09	2.715
A1. I	.897	.155	.028	.051	.086	.113	.060	.045			.011	.006	.001			
96	51.48	16.34	4.86	5.14	2.82	4.70	3.57	3.43	1.62	1.90	2.62	1.28	0.35	CO ₂ trace SO ₃ none Cl trace NiO none Li ₂ O none	100.11	2.760
A2. II	.858	.160	.031	.071	.071	.084	.057	.036			.033	.009	.005			
97	51.86	19.87	6.30	3.11	2.33	3.77	4.88	6.20	1.48			0.36		Cl 0.51	100.67	
A3. III	.864	.195	.039	.043	.058	.068	.079	.066				.003				
98	51.36	15.98	7.64	5.10	1.84	6.50	4.26	3.97	3.60			0.42			100.67	
A3. III	.856	.157	.048	.071	.046	.116	.069	.042				.003				
99	58.54	16.69	3.41	3.76	1.60	3.08	3.82	6.83	0.33		1.34	0.35			99.75	
A2. II	.976	.163	.021	.052	.040	.055	.061	.072			.017	.003				
100	57.33	18.14	0.26	7.77	3.05	5.61	3.11	3.61	0.39	0.12	0.96		trace	CO ₂ 0.02	100.37	
A3. III	.956	.178	.002	.108	.076	.100	.050	.038			.012		—		(100.17)	

RANG 2. DOMALKALIC. MONZONASE.

1	53.15	17.64	3.10	4.65	2.94	5.66	5.00	3.10	1.10		1.52	0.65	0.46	CO ₂ 0.39 SO ₃ 0.28 Cl 0.07 BaO 0.13	99.84	
A1. I	.886	.173	.019	.065	.074	.101	.081	.033			.019	.005	.007			
2	52.54	15.14	0.85	10.73	5.22	6.92	5.46	1.43	1.76		1.00				101.05	
B3. IV	.876	.148	.005	.149	.131	.123	.086	.015			.013					
3	49.49	16.67	4.35	12.71	2.21	3.98	4.75	2.61	1.51		1.45		0.35		100.08	
A2. II	.825	.163	.028	.176	.055	.071	.077	.028			.018		.005			
4	52.75	14.96	2.44	7.03	3.86	6.76	4.95	1.64	0.55	0.09	3.90	0.76		ZrO ₂ 0.02 S 0.05 BaO none	100.16	
A1. I	.883	.147	.015	.097	.097	.121	.080	.016			.049	.005				
5	59.27	15.76	2.07	3.57	3.04	3.69	5.63	3.33	0.74	0.23	1.12	0.42	0.37	CO ₂ 0.30 ZrO ₂ 0.04 Cl 0.03 F 0.32 FeS ₂ 0.07 NiO trace	100.10	
A1. I	.988	.155	.013	.050	.076	.066	.091	.035			.014	.003	.005			
6	56.53	16.47	1.58	5.40	2.67	4.90	5.59	3.80	0.60	0.23	1.40	0.27	0.20	CO ₂ 0.05 ZrO ₂ 0.03 Cl 0.07 F 0.19 FeS ₂ trace NiO trace BaO trace	99.99	
A1. I	.942	.161	.010	.075	.067	.088	.090	.040			.018	.002	.003			
7	56.51	16.59	1.35	6.59	2.52	4.96	5.15	3.05	0.71	0.21	1.20	0.41	0.24	CO ₂ 0.33 ZrO ₂ 0.04 Cl 0.07 F 0.06 FeS ₂ 0.06 BaO 0.03	100.26	
A1. I	.942	.163	.008	.092	.063	.089	.083	.032			.015	.003	.003			
8	56.01	15.19	2.34	4.89	4.67	4.85	5.66	2.16	0.90	0.36	1.13	0.53	0.40	FeS ₂ 0.09 NiO 0.03	99.21	
A2. II	.934	.149	.016	.068	.117	.087	.091	.023			.014	.004	.006			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBBRANG 3. SODIPOTASSIC. MONZONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
95	II.5.2''3''.	Q 1.50 di 9.48 or 25.02 hy 5.82 ab 31.44 mt 6.50 an 13.90 il 1.67 ap 2.02	Kiama, New South Wales.	H. P. White.	G. W. Card, pers. com.	Latite.	
96	II.5.2(3).3(4).	Q 6.54 hy 8.68 or 20.02 mt 7.19 ab 29.87 il 5.02 an 15.01 ap 3.02 C 1.33	Mount Macedon, Victoria.	A. G. Hall.	W. W. Skeats, Pr. Aust. A. A. S., 1910, p. 205.	Macedonite (orthoclase basalt).	Also in G. S. Vict. B. 24, p. 31, 1912.
97	(I)II.5(6).2.3.	or 36.70 di 0.22 ab 23.06 ol 4.40 an 15.85 mt 9.05 ne 7.95 ap 1.01 hl 0.82	Leith Valley, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Pr. Aust. A. A. S., 1904, p. 186.	Trachydol- erite.	Also in Q. J. G. S., LXII, p. 407, 1906.
98	II.5.2.3(4).	or 23.35 di 13.60 ab 32.49 ol 0.73 an 12.79 mt 11.14 ne 1.99 ap 1.01	Leith Valley, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 408, 1901.	Andesite.	
99	''II.5.2.3.	Q 2.94 di 3.37 or 40.03 hy 4.22 ab 31.96 mt 4.87 an 8.34 il 2.58 ap 1.01	Bras Rouge, Cilaos, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 543, 1912.	Monzonite.	
100	II.5.2.3''.	Q 2.88 di 2.35 or 21.13 hy 18.82 ab 26.20 mt 0.46 an 25.02 il 1.82	Cape Royds, Ross Region, S. Victoria Land, Antarctica.	Burrows and Walkom.	J. W. E. David, pers. com.	Not named.	Erratic block. Igneous?

SUBBRANG 4. DOSODIC. AKEROSE. (C. I. P. W., 1902.)

1	II.5.2''4.	or 18.35 di 5.62 ab 41.39 ol 6.67 an 16.40 mt 4.41 ne 0.57 il 2.89 ap 1.68	Sheffield Mountain, Quebec.	M. F. Connor.	J. A. Dresser, A. G., XXVIII, p. 207, 1901.	Essexite.	Also in Can. G. S., A. R. XIII (1900), p. 144, 1903.
2	II(III).5''2''4(5)	or 8.34 di 17.64 ab 36.15 ol 16.90 an 13.07 mt 1.16 ne 4.83 il 1.98	Cobalt, Ontario.	N. L. Bowen.	N. L. Bowen, J. Can. Min. Inst., XII, p. 519, 1910.	Diabase.	
3	II.5.2(3).4.	or 15.57 di 8.10 ab 35.11 ol 16.42 an 16.12 mt 6.50 ne 2.84 il 2.74	Munro Bay, Port Coldwell, Ontario.	E. L. C. Foster.	H. L. Kerr, Rep. Bur. Min. Ont., XIX (1), p. 228, 1910.	Diorite.	
4	II''5.2(3).4''.	Q 1.32 di 11.90 or 8.90 hy 8.31 ab 41.92 mt 3.48 an 14.18 il 7.45 ap 1.68	Lockes Hill, Belknap Moun- tains, New Hampshire.	H. S. Washing- ton.	Pirsson and Washing- ton, A. J. S., XXII, p. 455, 1906.	Spessartite.	
5	II.5.2.4.⊙	Q 2.58 di 6.05 or 19.46 hy 8.37 ab 47.68 mt 3.02 an 8.06 il 2.13 ap 1.01	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 84, 1903.	Akerite (segregation in granite).	In W. T., p. 261. Cf. No. 6, I.4.1.3.
6	II.5.2.4.⊙	or 22.24 di 11.47 ab 42.97 ol 5.03 an 8.62 mt 2.32 ne 2.27 il 2.74 ap 0.67	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 66, 1903.	Monzonite (segregation in paisan- ite).	In W. T., p. 261. Cf. No. 4, I.4.1.3.
7	II.5.2.4.⊙	or 17.79 di 7.24 ab 43.49 hy 9.84 an 13.34 ol 1.72 mt 1.86 il 2.28 ap 1.01	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 66, 1903.	Monzonite (segregation in nord- markite).	In W. T., p. 261. Cf. No. 4, I.5.1.3.
8	II.5.2.4.⊙	or 12.79 di 8.77 ab 47.68 hy 8.90 an 9.73 ol 3.15 mt 3.71 il 2.13 ap 1.34	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 84, 1903.	Akerite (segregation in granite).	In W. T., p. 261. Cf. No. 6, I.4.1.3.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9	55.28	17.23	1.54	6.23	2.69	5.60	5.42	2.10	0.71	0.20	1.64	0.73	0.24	CO ₂ 0.04 ZrO ₂ trace Cl 0.07 F 0.28 FeS ₂ 0.07 BaO 0.06	100.15	
A1. I	.921	.169	.010	.086	.067	.100	.087	.022			.021	.005	.003			
10	52.83	16.30	9.60	2.48	3.98	2.98	6.54	2.49	2.76				trace		99.96	
A3. III	.881	.160	.060	.035	.100	.054	.105	.027					—			
11	61.87	17.26	2.35	2.43	1.82	3.23	5.18	3.83	1.07		0.87		0.03		99.94	2.67
A2. II	1.036	.169	.015	.034	.046	.058	.083	.041		0.11		—				
12	61.08	16.62	2.87	2.56	1.65	3.66	4.75	3.90	0.97	0.44	0.73	0.63	trace	BaO 0.32 SrO 0.08 Li ₂ O trace	100.26	
A1. I	1.018	.163	.018	.036	.041	.065	.077	.041			.009	.005	—			
13	58.28	17.89	3.20	1.73	1.51	3.69	5.89	5.34	0.98	0.17	0.68	0.26	0.06	BaO 0.36 SrO 0.05 Li ₂ O trace	100.05	
A1. I	.971	.175	.020	.024	.038	.066	.095	.057			.009	.002	—			
14	56.75	16.40	4.78	3.10	3.22	5.34	4.19	3.36	0.82	0.40	0.86	0.52	0.17	BaO 0.33 SrO 0.10 Li ₂ O trace	100.34	
A1. I	.946	.161	.030	.043	.081	.095	.068	.036			.010	.004	.002			
15	58.08	18.38	3.02	1.42	0.96	3.85	6.22	5.11	1.55	0.37	0.58	0.21	0.10	SO ₃ 0.07 Cl trace S none BaO none	99.92	
A1. I	.968	.180	.019	.019	.024	.069	.100	.054			.007	.001	.001			
16	60.44	16.65	2.31	3.09	2.18	4.22	5.18	2.71	1.07	0.36	0.60	0.29	0.13	CO ₂ 0.48 S trace V ₂ O ₅ 0.02 NiO none BaO 0.12 SrO 0.11	99.96	2.677
A1. I	1.007	.163	.014	.043	.055	.075	.084	.029			.008	.002	.002			24°
17	55.53	16.78	4.06	3.35	3.00	6.96	4.31	3.57	0.55	0.09	0.95	0.47	0.16	CO ₂ 0.09 FeS ₂ 0.04 V ₂ O ₅ 0.02 NiO trace BaO 0.13 SrO 0.11	100.17	2.79
A1. I	.926	.164	.025	.047	.075	.125	.069	.038			.012	.003	.002			21°
18	57.01	18.41	3.69	2.36	2.34	4.29	4.95	3.72	2.29		0.27	0.42	0.21		99.96	2.699
A2. II	.950	.180	.023	.033	.059	.077	.080	.040			.004	.003	.003			34°
19	53.80	20.13	3.57	2.63	2.26	5.60	5.20	4.49	0.90		0.43	0.56	0.29		99.86	2.768
A2. II	.897	.197	.022	.036	.047	.100	.084	.048			.005	.004	.004			34°
20	58.05	17.66	3.51	1.65	1.55	4.48	5.80	4.06	0.87	0.35	0.91	0.40	0.13	CO ₂ none ZrO ₂ 0.02 SO ₃ 0.04 Cl trace Cr ₂ O ₃ none BaO 0.19 SrO 0.08	99.75	
A1. I	.968	.173	.022	.023	.039	.080	.094	.043			.011	.003	.002			
21	56.01	17.92	4.22	2.52	2.04	4.80	4.92	4.21	1.10	0.31	1.20	0.55	0.13	CO ₂ none ZrO ₂ 0.02 Cl trace S 0.02 Cr ₂ O ₃ none BaO 0.16 SrO 0.06	100.19	
A1. I	.934	.176	.026	.035	.051	.086	.079	.045			.015	.004	.002			
22	51.89	17.94	3.85	3.37	2.88	5.62	4.63	4.50	2.09	0.72	1.34	0.67	0.08	ZrO ₂ 0.03 Cl trace FeS ₂ 0.41 BaO 0.19 SrO 0.11	100.32	
A1. I	.865	.176	.024	.047	.072	.100	.074	.048			.017	.005	.001			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	II.5.2(3).4.	or 12.79 di 5.29 ab 45.59 hy 10.41 an 16.68 ol 9.69 mt 2.32 il 3.19 ap 1.68	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 209, p. 44, 1903.	Diorite (segregation in diorite).	In W. T., p. 261.
10	II.5."2.4.	or 15.01 di 5.62 ab 47.68 ol 5.18 an 7.78 mt 8.12 ne 3.98 hm 4.00	Little Montreal River, Keweenaw Point, Michigan.	F. P. Burrall.	L. L. Hubbard, Mich. G. S., VI, Pt. 2, p. 25, 1898.	Diabase porphyrite.	Not in W. T.
11	(I)II.(4)5.2."4.	Q 8.10 di 2.87 or 22.80 hy 4.29 ab 43.49 mt 3.43 an 12.51 il 1.67	Cottonwood Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 88, 1896.	Dioritic syenite.	Inclusion in granite, No. 67, I.4.1.3. In W. T., p. 261.
12	(I)II.(4)5.2.(3).4.	Q 10.02 di 0.68 or 22.30 hy 6.53 ab 40.35 mt 4.18 an 12.51 il 1.37 ap 1.68	Three Peaks, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 142, 1897.	Porphyrite.	In W. T., p. 261.
13	(I)II.5.(1)2.(3).4.	or 31.69 di 7.78 ab 41.92 ol 0.14 an 6.39 mt 3.71 ne 4.26 il 1.37 hm 0.64 ap 0.67	Shields River Basin, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 143, 1897.	Syenite.	In W. T., p. 261.
14	II."5.2(3).(3).4.	Q 5.82 di 5.43 or 20.02 hy 6.88 ab 35.63 mt 6.96 an 15.85 il 1.52 ap 1.34	Shields River Basin, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 143, 1897.	Porphyrite.	In W. T., p. 261.
15	(I)II.5.(1)2.(3).4.	or 30.02 di 5.13 ab 42.97 wo 1.88 an 7.23 mt 3.02 ne 5.11 il 1.06 hm 0.96 ap 0.34	Sundance quadrangle, Wyoming.	G. Steiger.	W. S. T. Smith, U. S. G. S. Fol. 127, p. 7, 1905.	Trachytoid phonolite.	
16	"II.(4)5.2.4.	Q 7.98 di 4.05 or 16.12 hy 6.58 ab 44.02 mt 3.25 an 13.90 il 1.22 ap 0.67	Deadwood Gulch, La Plata Mountains, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. Fol. 60, p. 7, 1899.	Diorite porphyry.	In W. T., p. 261.
17	II.5.2(3).(3).4.	Q 1.50 di 12.79 or 21.13 hy 3.03 ab 36.16 mt 5.80 an 15.85 il 1.82 ap 1.01	La Plata Mountains, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. Fol. 60, p. 6, 1899.	Monzonite.	Facies of diorite. In W. T., p. 263.
18	(I)II.5.2"."4.	Q 2.04 di 1.54 or 22.24 hy 6.49 ab 41.92 mt 5.34 an 16.68 il 0.46 ap 1.01	Lookout Mountain, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, II, p. 321, 1896.	Andesite.	In W. T., p. 261.
19	(I)II.5"."2"."(3).4.	or 26.69 di 4.91 ab 31.96 ol 2.92 an 18.07 mt 5.10 ne 6.53 il 0.76 ap 1.34	Mount Fairview, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, II, p. 324, 1896.	Augite diorite.	In W. T., p. 261.
20	(I)II.5.2."4.	or 23.91 di 7.34 ab 49.25 hy 0.70 an 10.01 mt 2.78 il 1.67 hm 1.60 ap 1.01	Anaconda Mine, Cripple Creek, Colorado.	W. T. Schaller.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 79, 1906.	Latite- phonolite.	
21	"II.5.2.(3).4.	Q 0.12 di 6.70 or 25.02 hy 2.20 ab 41.39 mt 4.64 an 14.46 il 2.28 hm 0.96 ap 1.34	Portland Mine, Cripple Creek, Colorado.	W. T. Schaller.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 79, 1906.	Latite- phonolite.	
22	II.5.2.(3).4.	or 26.69 di 6.36 ab 31.06 ol 3.63 an 15.29 mt 5.57 ne 4.12 il 2.58 ap 1.68 pr 0.41	Portland Mine, Cripple Creek, Colorado.	W. F. Hille- brand.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 87, 1906.	Syenite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
23	49.84	17.78	5.86	2.62	3.02	7.35	5.20	3.04	2.02	0.34	1.43	0.76	0.21	CO ₂ 0.52 ZrO ₂ 0.03 SO ₃ none Cl trace V ₂ O ₅ 0.03 BaO 0.22 SrO 0.18 Li ₂ O trace	100.42	
A1. I	.831	.174	.037	.036	.076	.131	.084	.032			.018	.005	.003			
24	48.76	17.04	5.04	3.52	4.57	8.64	4.27	3.39	1.84	0.69	1.34	0.79	0.08	CO ₂ 0.22 ZrO ₂ trace Cl 0.01 S 0.06 BaO 0.15 SrO 0.07	100.48	
A1. I	.813	.167	.032	.049	.114	.154	.069	.036			.017	.005	.001			
25	57.35	16.29	3.15	4.36	2.41	5.66	4.50	3.39	0.70	0.15	1.07	0.70	0.12	CO ₂ 0.46 ZrO ₂ trace FeS ₂ 0.09 Cr ₂ O ₃ none V ₂ O ₅ trace NiO none BaO 0.10 SrO 0.05 ZnO none Li ₂ O none	100.55	2.763
A1. I	.956	.160	.020	.061	.060	.101	.073	.036			.013	.005	.002			
26	55.44	14.95	4.37	5.18	3.58	6.12	4.44	2.83	0.84	0.12	1.22	0.49	0.22	CO ₂ 0.35 ZrO ₂ none FeS ₂ 0.09 BaO 0.16 SrO 0.04 Li ₂ O none	100.44	2.827
A1. I	.924	.147	.028	.072	.090	.109	.072	.030			.015	.004	.003			
27	56.83	16.90	6.85	0.13	2.67	4.92	4.58	4.00	0.40	0.38	1.41	0.50	0.11	CO ₂ none ZrO ₂ none S none Cr ₂ O ₃ trace V ₂ O ₅ none BaO 0.12 SrO 0.06	99.86	
A1. I	.947	.166	.043	.002	.067	.088	.074	.042			.018	.004	.002			
28	54.72	16.60	3.81	4.11	2.88	6.31	4.04	3.49	0.49	0.68	1.52	0.77	0.09	CO ₂ none ZrO ₂ none S none Cr ₂ O ₃ 0.01 V ₂ O ₅ none BaO 0.12 SrO 0.05	99.69	
A1. I	.912	.163	.024	.057	.072	.113	.065	.037			.019	.005	.001			
29	61.21	17.10	2.72	1.88	1.47	4.83	5.66	3.00	0.68	0.34	0.51	0.24	0.15	CO ₂ none ZrO ₂ 0.02 Cl 0.04 S none BaO 0.13 SrO 0.07	100.05	
A1. I	1.020	.168	.017	.026	.037	.086	.091	.032			.006	.002	.002			
30	53.52	17.88	4.21	3.51	3.90	7.36	5.19	2.39	none	0.15	1.14	1.26	0.11	CO ₂ none S none	100.62	
A2. II	.892	.175	.026	.049	.098	.131	.084	.026			.014	.009	.002			
31	52.06	15.52	5.49	7.06	2.23	5.46	5.24	2.24	0.59	1.00	2.41	0.32	0.12	CO ₂ none	99.74	
A2. II	.868	.152	.034	.068	.056	.097	.084	.023			.030	.002	.002			
32	62.08	17.91	1.08	3.08	1.77	4.54	5.12	2.96	0.20	0.05	0.54	0.17	0.11	BaO 0.14 SrO trace	99.75	
A2. II	1.035	.176	.007	.043	.044	.081	.082	.032			.007	.001	.002			
33	58.67	15.67	2.85	3.28	3.86	5.33	4.77	3.08	0.54	0.02	1.00	0.16	0.11	BaO 0.11 SrO 0.09	99.54	2.751
A2. II	.978	.154	.018	.046	.097	.095	.077	.033			.013	.001	.002			
34	57.87	16.76	2.21	4.60	3.29	6.23	4.07	2.17	0.91	0.32	1.21	0.34	0.04	CO ₂ none ZrO ₂ 0.02 FeS ₂ 0.23 BaO 0.02	100.34	
A2. II	.965	.164	.014	.064	.082	.111	.066	.023			.015	.002	—			
35	59.50	14.78	1.93	1.23	3.09	7.87	4.44	3.95	0.84	0.39	1.01	0.89	trace	CO ₂ 0.18 SrO 0.05	100.15	
A2. II	.992	.145	.012	.017	.077	.141	.072	.042			.013	.006	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
23	II.5(6).2.4.	or 17.79 di 12.10 ab 30.39 ol 1.40 an 16.12 mt 4.37 ne 7.38 il 2.74 hm 2.56 ap 1.68	Bull Cliff, Cripple Creek, Colorado.	W. F. Hille- brand.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 90, 1906.	Trachy- dolerite.	In W. T., p. 263.
24	II''5(6).2(3).(3)4.	or 20.02 di 16.20 ab 20.96 ol 2.80 an 17.24 mt 7.42 ne 8.24 il 2.53 ap 1.68	Isabella Dike, Cripple Creek, Colorado.	W. T. Schaller.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 93, 1906.	Trachy- dolerite.	FeO corrected.
25	II.''5.2''.''4.	Q 5.22 di 5.23 or 20.02 hy 7.46 ab 38.25 mt 4.64 an 14.18 il 1.98 ap 1.68	Wellington Mine, Breckinridge District Colorado.	W. T. Schaller.	F. L. Ransome, U. S. G. S. P. P. 75, p. 55, 1911.	Diorite porphyry.	No rare earths.
26	II.5.2.4.⊙	Q 2.94 di 11.44 or 16.68 hy 7.71 ab 37.73 mt 6.50 an 12.51 il 2.28 ap 1.34	Wellington Mine, Breckinridge District, Colorado.	W. T. Schaller.	F. L. Ransome, U. S. G. S. P. P. 75, p. 55, 1911.	Diorite porphyry.	
27	II.5.2.(3)4.	Q 3.54 di 2.38 or 23.35 hy 5.60 ab 38.77 il 0.61 an 13.90 hm 6.85 tn 2.74 ap 1.34	Devils Lake, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Andesite.	
28	II.5.2(3).(3)4.	Q 3.34 di 7.78 or 18.57 hy 5.44 ab 34.06 mt 5.57 an 16.96 il 2.89 ap 1.68	Devils Lake, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Basalt.	
29	(I)II.''5.2.4.	Q 6.96 di 7.47 or 17.79 hy 0.83 ab 47.68 mt 3.94 an 12.51 il 0.91 ap 0.67	Near Mount Peale, La Sal Mountains, Utah.	W. F. Hille- brand.	L. M. Prindle, U. S. G. S. B. 228, p. 191, 1904.	Monzonite porphyry.	
30	II.5.2(3).4.	or 14.46 di 6.72 ab 42.97 ol 5.44 an 18.07 mt 6.03 ne 0.57 il 2.13 ap 3.02	Johnsons Park, Colfax County, New Mexico.	J. G. Fairchild.	J. B. Martie, U. S. G. S. rec. lab.	Andesite.	
31	II.5.2.4.⊙	or 12.79 di 10.26 ab 44.01 hy 5.31 an 12.51 mt 7.89 il 4.56 ap 0.67	Little Ash Creek, Bradshaw Mountains, Arizona.	G. Steiger.	Jaggard and Palache, U. S. G. S. Fol. 126, p. 7, 1905.	Trachy- dolerite.	
32	(I)II(4)5.2(3).4.	Q 8.16 di 3.68 or 17.79 hy 6.67 ab 42.97 mt 1.62 an 17.24 il 1.06 ap 0.34	Hedley District, British Columbia.	M. F. Connor.	C. Camsell, Can. G. S. Mem. 2, p. 96, 1910.	Granodiorite.	MgO corr. by C. C., pers. com.
33	II.5.2.''4.	Q 4.08 di 10.59 or 18.35 hy 6.92 ab 40.35 mt 4.18 an 12.23 il 1.98 ap 0.34	Record Mountain, Rossland Mountains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 328, 1912.	Latite.	
34	II.(4)5.2.4.	Q 8.10 di 6.55 or 12.79 hy 9.63 ab 34.58 mt 3.25 an 20.85 il 2.28 ap 0.67	Riddle quadrangle, Oregon.	R. C. Wells.	J. S. Diller, U. S. G. S. rec. lab.	Granodiorite?	
35	II.''5.2.(3)4.	Q 4.74 di 16.63 or 23.35 wo 1.51 ab 37.73 mt 0.93 an 8.62 il 1.98 hm 1.28 ap 2.02	Aranzazu, Concepcion del Oro, Zacatecas, Mexico.	M. Dittrich.	A. Bergeat, N. J. B. B., XXVIII p. 438, 1909.	Granodiorite.	Also in Inst. G. Mex. B. 27, p. 12, 1910.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
36	52.55	14.96	5.80	6.19	3.22	7.05	5.37	2.83	2.48						100.45	2.87
A3. III	.876	.147	.036	.086	.081	.126	.087	.030								
37	61.26	16.15	4.39	2.66	2.91	5.75	4.93	2.65	0.15						100.85	
A3. III	1.021	.158	.027	.037	.073	.102	.079	.028								
38	62.98	15.50	2.88	2.85	3.17	2.95	5.90	2.77	0.70		0.68	0.25			100.63	2.582
A2. II	1.050	.152	.018	.040	.079	.053	.095	.030			.008	.002				
39	58.82	16.35	5.50	2.36	4.37	4.06	5.31	2.02	1.05		0.36	0.25			100.45	2.736
A2. II	.980	.160	.034	.033	.109	.073	.085	.021			.004	.002				
40	60.90	17.67	2.71	1.70	1.49	4.93	5.27	3.15	1.31		0.46	0.24	0.17	SrO trace	100.05	2.690
A2. II	1.015	.173	.017	.024	.037	.088	.085	.034			.006	.002	.002			
41	59.06	16.79	3.47	4.81	3.00	5.22	4.60	2.79	0.95						100.69	
A3. III	.984	.164	.022	.067	.075	.093	.074	.030								
42	56.27	12.79	2.55	7.24	3.14	8.89	4.07	1.96	0.44	0.36	2.62	0.23	none	CO ₂ S none trace	100.65	
A2. II	.938	.125	.016	.100	.079	.159	.066	.021			.033	.002	—			
43	54.89	16.54	1.85	12.30	1.52	1.08	5.39	2.35	2.29	0.11	0.38	0.07	0.84	CO ₂ S 0.42 0.02 NiO 0.02 BaO none Li ₂ O trace	100.07	
A1. I	.915	.162	.012	.171	.038	.020	.087	.025			.005	—	.012			
44	49.24	15.84	6.09	7.18	3.02	5.26	5.21	2.10	1.61	1.08	1.84	1.47	0.17	F S 0.18 0.03 Cr ₂ O ₃ trace NiO trace BaO 0.09 SrO trace	100.53	2.79
A1. I	.821	.155	.038	.100	.076	.094	.084	.022			.023	.010	.002			
45	59.84	15.71	1.68	7.03	1.37	3.71	6.52	2.76	0.31	0.14	0.64	0.20	0.12	S 0.10	100.13	
A2. II	.997	.154	.011	.097	.034	.066	.105	.030			.008	.001	.002			
46	60.65	18.57	1.25	4.25	2.00	3.20	4.98	4.28	1.80				trace		100.99	
B3. IV	1.011	.182	.008	.059	.050	.057	.081	.045					—			
47	57.20	17.06	3.14	3.69	2.45	5.83	5.95	2.72	n. d.		1.28	0.45			99.77	
A2. II	.953	.167	.020	.051	.061	.104	.096	.029			.016	.003				
48	56.77	18.32	2.80	3.58	1.81	4.61	5.47	3.52	0.17		2.40	0.58	0.23	SO ₃ BaO 0.04 0.03	100.33	
A2. II	.946	.180	.013	.050	.045	.082	.089	.037			.030	.004	.003			
49	54.69	18.16	5.71	1.79	1.99	5.68	5.25	3.28	0.19		2.31	0.71	0.17	SO ₃ Cr ₂ O ₃ 0.03 none V ₂ O ₅ 0.03 BaO 0.13	100.12	
A1. I	.912	.178	.036	.025	.050	.101	.085	.035			.029	.005	.002			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBBRANG 4. DOSODIC. AKEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
36	II''5(6).2.4.	or 16.68 di 21.99 ab 32.49 ol 3.41 an 8.34 mt 8.35 hl 7.10	Culebra Island, West Indies.	T. Nordström.	P. T. Cleve, Sv. Vet. Ak. Hndl., IX, No. 12, p. 38, 1871.	Labrador porphyrite.	Also in A. G. Hogbom, B. G. Inst. Ups., VI, p. 230, 1905. Not in W. T.
37	II.(4)5.2''4.	Q 8.58 di 11.21 or 15.57 hy 3.33 ab 41.40 ol 6.26 an 14.18	Lava of 1869, Pasto Volcano, Colombia.	R. Kück.	R. Kück, G. Stud. Col., I, p. 141, 1892.	Pyroxene andesite.	In W. T., p. 263.
38	''II.(4)5.''2.4.	Q 8.04 di 4.20 or 16.68 hy 7.75 ab 49.78 mt 3.67 an 7.51 il 1.22 ap 0.67	Toruno Caldera, Quilindana Volcano, Ecuador.	A. Young.	A. Young, Hochg. Rep. Ec., * II (2), p. 252, 1902.	Andesite.	
39	II.''5.2''4.	Q 6.90 di 2.59 or 11.68 hy 9.70 ab 44.54 mt 6.73 an 15.01 il 0.61 hm 0.80 ap 0.67	Ceballos-chupa, Sincholagua Volcano, Ecuador.	A. Young.	A. Young, Hochg. Rep. Ec., II (2), p. 248, 1902.	Pyroxene andesite.	
40	(I)II.''5.2''4.	Q 7.14 di 7.44 or 18.90 hy 0.60 ab 44.54 mt 3.94 an 15.01 il 0.91	Cerro de Don Prajido, San Luis, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXIII, p. 596, 1906.	Andesite.	
41	II.''5.2(3).4.	Q 5.02 di 7.51 or 16.68 hy 9.76 ab 38.73 mt 5.10 an 16.68	Cuesta del Cuzco, San Antonio Valley, Argentina.	B. Wetzig.	A. Stelzner, Btr. G. Arg. Rep., I, p. 212, 1885.	Andendiorite.	In W. T., p. 263.
42	II(III)''5.2''4.	Q 5.76 di 26.06 or 11.68 hy 1.79 ab 34.58 mt 3.71 an 10.56 il 5.02 ap 0.67	North of Neochea, Argentina.	J. G. Fairchild.	Wright and Fenner, Bur. Am. Ethn. B. 52, p. 81, 1912.	Andesite scoria.	
43	II.5.''2.4.	or 13.90 hy 25.71 ab 45.59 mt 2.78 an 5.56 il 0.76 C 3.06	Carn Chuinneag, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot., Mem. XCIII, p. 97, 1912.	Albite gneiss.	Igneous? MnO high?
44	II.5.2''4.	or 12.23 di 2.72 ab 44.01 hy 2.32 an 13.62 ol 6.84 mt 8.32 il 3.50 ap 3.36	Druim na Criche, Portree, Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, p. 263, 1904.	Mugearite.	
45	II.5.(1)2.4.	or 16.68 di 11.21 ab 55.02 hy 2.81 an 5.28 ol 4.07 mt 2.55 il 1.22 ap 0.34	Gwavas Quarry, Newlyn, Cornwall.	W. Pollard.	Reid and Flett, G. S. Eng. Wal., Mem. Sh. 351, p. 35, 1907.	Diabase.	
46	(I)II.5.2.(3)4.	Q 2.52 hy 11.73 or 25.02 mt 1.86 ab 42.44 an 15.57	Cevins, Isere Valley, France.	E. Ritter.	E. Ritter, Sv. Ct. G. Fr. B., IX, No. 60, p. 32, 1897.	Inclusion in protogine.	Not in W. T.
47	II.5.2.4.⊙	or 16.12 di 11.55 ab 50.30 hy 0.63 an 11.68 ol 1.39 mt 4.64 il 3.71 ap 1.01	Volvic, Puy de Dome, Auvergne.	Pisani.	A. Lacroix, pers. com.	Andesite.	
48	''II.5.2.4.	Q 1.02 di 3.30 or 20.57 hy 3.60 ab 46.63 mt 4.18 an 15.01 il 4.56 ap 1.34	Volvic, Puy de Dome, Auvergne.	P. Holland.	Dickson and Holland, Pr. Liv. G. Soc., VIII, p. 412, 1899.	Andesite.	Not in W. T.
49	II.5.2''4.	or 19.46 di 5.62 ab 44.54 hy 2.40 an 16.12 ol 4.10 hm 5.71 pf 0.27 ap 1.68	Puy de Pariou, Puy de Dome, Auvergne.	P. Holland.	Dickson and Holland, Pr. Liv. G. Soc., VIII, p. 412, 1899.	"Lava" (andesite).	Not in W. T.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
50	53.78	16.18	7.91	0.66	3.51	6.70	4.69	3.41	0.25		1.80	0.60	0.25	SO ₃ 0.06 BaO 0.04	99.84	
A2. II	.896	.159	.049	.009	.088	.120	.076	.036			.023	.004	.004			
51	57.99	19.47	3.60	4.12	2.07	4.40	6.01	2.23	(0.27)		1.04				100.93	2.546
B3. IV	.967	.191	.023	.057	.052	.079	.097	.023			.013					
52	57.60	16.83	0.84	4.16	1.90	5.21	4.45	3.82	1.50		2.28	0.37		FeS ₂ 1.93	100.89	
A2. II	.960	.165	.005	.057	.048	.093	.072	.040			.029	.003				
53	54.61	19.20	2.96	2.91	1.02	4.70	5.00	4.36	3.25		1.92	trace			99.93	
A2. II	.910	.188	.019	.040	.026	.084	.081	.047			.024	—				
54	62.28	17.32	4.00	0.94	3.96	2.08	6.04	2.98	1.02						100.62	
A3. III	1.038	.170	.025	.013	.099	.038	.097	.032								
55	61.12	17.06	3.20	2.96	1.17	2.91	7.25	2.04	0.74		1.35	0.02	0.23		100.04	
A2. II	1.019	.167	.020	.041	.029	.052	.117	.021			.017	—	.003			
56	60.97	15.39	3.29	1.19	3.39	5.04	5.65	2.88	0.60		1.65	0.11	0.36		100.52	
A2. II	1.016	.151	.021	.017	.065	.090	.091	.031			.021	.001	.005			
57	59.71	16.18	4.89	2.64	1.54	3.77	5.93	3.69	0.22	(0.07)	0.66	0.44	0.09	S trace	99.76	
A2. II	.995	.159	.031	.037	.039	.068	.095	.039			.008	.003	.001			
58	60.12	16.63	2.19	4.79	0.82	3.75	4.73	4.25	0.25		0.95	0.77	0.10	BaO 0.21	99.56	
A2. II	1.002	.163	.014	.067	.021	.067	.076	.045			.012	.005	.001			
59	53.96	15.98	2.76	6.16	1.58	5.82	4.18	3.72	0.27		2.45	1.85	0.27	FeS ₂ 0.35 BaO 0.19	99.54	
A2. II	.899	.157	.017	.086	.040	.104	.068	.039			.031	.013	.003			
60	57.21	16.03	1.65	7.33	3.36	5.18	4.12	3.50	0.56	0.30	0.60	0.20	0.18	S 0.10	100.46	
A2. II	.954	.157	.010	.103	.084	.093	.066	.037			.009	.001	.003			
61	53.20	14.30	3.93	8.58	3.91	5.51	5.58	2.70	2.22		0.70	0.43	trace		101.06	2.783
B2. III	.887	.140	.024	.119	.098	.098	.090	.029			.009	.003	—			
62	56.99	17.62	2.65	3.75	2.79	4.40	5.95	2.88	0.60		0.60	1.05	0.19		99.47	
A2. II	.950	.173	.017	.052	.070	.079	.096	.031			.008	.008	.003			
63	58.04	16.78	5.13	3.63	2.62	4.52	5.41	4.14	0.57				trace	Cl trace	100.84	
A3. III	.967	.164	.031	.050	.066	.080	.087	.044					—			
64	57.90	16.01	5.82	4.21	2.34	5.11	4.46	3.73	0.98				trace		100.56	
A3. III	.965	.157	.036	.058	.059	.091	.072	.039					—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
50	II.5.2."4.	or 20.02 di 9.94 ab 39.82 hy 3.40 an 13.07 ol 0.56 il 1.37 hm 7.91 pf 1.90 ap 1.34	Mont Dore, Auvergne.	P. Holland.	Dickson and Holland, Pr. Liv. G. Soc., VIII, p. 412, 1899.	Sanidine andesite.	Iron oxides? Not in W. T.
51	(I)II.5.2(3).4.	Q 1.44 di 1.79 or 12.79 hy 7.11 ab 50.83 mt 5.34 an 19.74 il 1.98	Plomb du Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. Fr. Min., XXV, p. 335, 1902.	Biotite andesite.	
52	II.5.2".(3).4.	Q 4.86 di 6.80 or 22.24 hy 4.52 ab 37.73 mt 1.16 an 14.73 il 4.41 ap 1.01 pr 1.93	Fournol, Cantal, Auvergne.	Pisani.	A. Lacroix, C. R., CXLIX, p. 546, 1909.	Andesite.	
53	(I)II.5.2".(3).4.	or 26.13 di 5.18 ab 41.39 ol 0.14 an 16.68 mt 3.71 ne 0.57 il 3.65 hm 0.48	Fournol, Cantal, Auvergne.	Pisani.	A. Lacroix, C. R., CXLIX, p. 546, 1909.	Monzonite.	
54	(I)II.5.2.4.	Q 5.34 hy 9.90 or 17.79 mt 3.02 ab 50.83 hm 1.92 an 10.56 C 0.31	Osani, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 54, 1907.	Trachy- andesite.	
55	(I)II.5."2.4(5).	Q 4.44 di 5.10 or 11.68 hy 1.40 ab 61.31 mt 4.64 an 8.06 il 2.58	Kiruna, Lapland, Sweden.	Lundbohm.	O. Stutzer, N. J. B. B., XXIV, p. 566, 1907.	Soda syenite porphyry.	
56	II.5.2.4.⊙	Q 4.98 di 12.53 or 17.24 hy 2.70 ab 47.68 mt 0.23 an 8.06 il 3.19 hm 3.20 ap 0.34	W. of Kapten, Kiruna, Lapland, Sweden.	Lundbohm.	O. Stutzer, N. J. B. B., XXIV, p. 566, 1907.	Soda syenite porphyry.	
57	"II.5."2.4.	Q 4.14 di 7.13 or 21.68 hy 0.90 ab 49.78 mt 6.96 an 6.95 il 1.22 hm 0.16 ap 1.01	Kiirunavaara, Lapland, Sweden.	G. Nyblom.	P. Geijer, G. Kir. Dist., p. 33, 1910.	Syenite porphyry.	
58	(I)II."5.2.(3).4.	Q 7.26 di 1.89 or 25.02 hy 6.68 ab 39.82 mt 3.25 an 11.68 il 1.82 ap 1.68	Warberg, Halland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Granite.	
59	II.5.2".(3).4.	Q 3.90 di 2.57 or 21.68 hy 8.12 ab 35.63 mt 3.94 an 13.90 il 4.71 ap 4.37	Apelvik, Warberg, Halland, Sweden.	R. Mauzelius.	P. J. Holmquist, B. Un. Ups., VII, p. 266, 1906.	Grano- diorite.	
60	II.5.2".(3).4.	Q 1.26 di 8.36 or 20.57 hy 15.71 ab 34.58 mt 2.32 an 15.01 il 1.37 ap 0.34	Svartsbergvik, N. Ulfön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 129, 1913.	Monzonite.	
61	II".5".(1)2.4.	or 16.12 di 15.46 ab 39.30 ol 9.95 an 5.84 mt 5.57 ne 4.26 il 1.37 ap 1.01	Silfberg, Dalarne, Sweden.	O. Larsson.	M. Weibull, Lunds Aarsk., XXXIII, No. 4, p. 16, 1897.	Augite porphyrite.	Not in W. T.
62	II.5.2.4.⊙	or 17.24 di 1.36 ab 50.30 hy 8.37 an 12.79 ol 1.11 mt 3.94 il 1.22 ap 2.52	Autionsaari, Tavajärvi, Kuopio, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., 15, p. 52, 1905.	Soda minette.	
63	II.5.2."4.	or 24.46 di 10.50 ab 45.59 hy 0.43 an 9.17 ol 2.58 mt 7.19	Bruderkunzberg, n. Honnef, Siebengebirge.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn., LIII, p. 48, 1896.	Trachyte.	Light. In W. T., p. 263.
64	"II.5.2.(3).4.	Q 4.86 di 10.10 or 21.68 hy 3.92 ab 37.73 mt 8.35 an 12.79	Bruderkunzberg, n. Honnef, Siebengebirge.	W. Bruhns.	W. Bruhns, Vh. Nh. Ver. Bonn., LIII, p. 48, 1896.	Trachyte.	Dark. In W. T., p. 263.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
65	53.33	15.58	2.61	3.34	9.38	4.70	4.70	2.94	2.38		0.41	0.06	0.84	S 0.04	99.73	2.757
A2. II	.889	.153	.016	.046	.235	.084	.076	.031			.005	—	.012			
66	53.26	16.63	8.29	3.21	1.10	7.30	5.31	3.54	1.43		0.31				100.38	2.671
A3. III	.888	.163	.052	.044	.028	.130	.085	.037			.004					
67	59.69	18.16	3.01	2.47	1.99	4.15	5.03	3.34	1.18	0.27	0.09	0.64		SO ₃ 0.35	100.36	
A2. II	.995	.178	.019	.035	.050	.074	.081	.035			.001	.005				
68	57.90	16.56	3.05	2.93	2.90	5.14	5.07	2.10	2.34		0.92	0.62			99.53	
A2. II	.965	.162	.019	.040	.073	.090	.082	.022			.011	.004				
69	59.79	13.90	3.11	3.91	4.18	3.52	4.70	3.78	1.26		1.24	0.33	trace	CO ₂ 0.22	99.94	2.760
A2. II	.995	.136	.019	.054	.105	.063	.076	.040			.016	.002	—			
70	56.18	16.14	3.44	4.27	4.74	6.45	4.37	2.97	0.68		0.77	0.13	0.36	CO ₂ 0.03 SO ₃ 0.01 S 0.03	100.57	
A2. II	.836	.158	.022	.060	.119	.115	.071	.032			.010	.001	.005			
71	60.55	16.57	2.29	4.64	2.37	3.59	4.72	3.34	1.46		0.68	0.54			100.75	
A2. II	1.009	.162	.014	.064	.059	.064	.076	.035			.009	.004				
72	56.20	16.54	3.35	6.70	3.32	3.66	4.94	2.91	1.52		0.82	0.53			100.49	
A2. II	.937	.162	.021	.093	.083	.065	.080	.031			.010	.004				
73	56.37	16.65	5.67	0.43	1.54	4.32	4.65	4.54	3.39		1.56	1.07			100.19	
A2. II	.940	.163	.036	.006	.039	.077	.075	.048			.020	.008				
74	55.80	17.65	4.61	0.85	1.19	4.50	4.63	3.61	2.53	1.58	1.07	0.59	0.56	CO ₂ 0.14 Cl 0.12	99.43	2.434
A2. II	.930	.173	.029	.012	.030	.080	.074	.038			.013	.004	.007			
75	50.51	17.84	5.25	4.46	3.34	7.93	5.09	3.49	0.74		0.95	1.11		CO ₂ 0.43	101.14	2.855
B2. III	.842	.175	.033	.062	.084	.141	.082	.037			.012	.008				
76	52.67	13.66	7.33	1.44	4.01	7.94	3.79	2.51	1.51	1.07	2.58	0.52	0.78	F 0.17	99.98	2.755
A2. II	.878	.134	.046	.020	.100	.142	.061	.027			.032	.004	.011			
77	52.00	14.08	8.40	1.09	3.91	9.61	3.83	2.58	0.42	0.91	2.01	0.49	0.72	CO ₂ trace F 0.18	100.23	2.729
A2. II	.867	.138	.053	.015	.098	.171	.061	.028			.025	.004	.010			
78	53.33	15.80	7.15	5.20	2.47	4.15	6.96	2.21	2.80	0.50					100.57	
A3. III	.889	.155	.045	.072	.062	.074	.112	.023								
79	61.63	17.71	1.12	4.34	0.80	3.40	5.38	3.96	0.68		0.68				99.70	
A73. III	1.027	.174	.007	.060	.020	.061	.087	.043			.008					

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
65	II.5.2.4.⊙	or 17.24 di 8.37 ab 34.84 ol 17.40 an 12.79 mt 3.71 ne 2.70 il 0.76	Hutberg, n. Raifersdorf, Aachen, Rheinland.	Lindner.	E. Dathe, Jb. Pr. G. L.-A., XIX, p. cxxix, 1899.	Vogesite.	Not in W. T.
66	II.5.2.''4.	or 20.57 di 6.05 ab 38.78 wo 7.08 an 11.40 mt 9.25 ne 3.12 il 0.61 hm 1.92	Käuling-Beilstein, Kreuzberg, Rhöngelbirge.	E. v. Seyfried.	E. v. Seyfried, Jb. Pr. G. L.-A., XVII, p. 33, 1897.	Tephrite.	In W. T., p. 263.
67	(I)II.''5.2(3).4.	Q 7.20 hy 6.98 or 19.46 mt 4.41 ab 42.44 il 0.15 an 15.85 ap 1.68 C 0.51	Birkenauer Thal, Hesse.	Surv. lab.	G. Klemm, Erl. G. Kt. Hes., Bl. Birkenau, p. 29, 1905.	Granite.	
68	''II.(4)5.2(3).4.	Q 7.98 di 4.16 or 12.23 hy 6.66 ab 42.97 mt 4.41 an 16.12 il 1.67 ap 1.34	Bergfeld, Westerwald, Hesse-Nassau.	H. Schneider- höhn.	H. Schneiderhöhn, Jb. Pr. G. L.-A., XXX, (II), p. 306, 1910.	Trachy- andesite.	
69	II.''5.(1)2.(3).4.	Q 5.94 di 7.97 or 22.24 hy 9.22 ab 39.82 mt 4.41 an 5.56 il 2.43 ap 0.67	Pyrna, Saxony.	C. Ambronn.	C. Ambronn, In. Diss. Leip., p. 53, 1907.	Pyroxene granite porphyry.	
70	II.5.2.''4.	or 17.79 di 12.69 ab 39.30 hy 4.82 an 15.29 ol 3.85 mt 5.10 il 1.52 ap 0.34	Stengert, Spessart, Bavaria.	A. Schwager.	H. Thürach, Geogn. Jhft., V (1892), p. 100, 1893.	Camptonite.	Aschaffite of Gümbel in G. von Bayern, II, p. 617, 1894. Not in W. T.
71	''II.(4)5.2.''4.	Q 8.46 hy 11.31 or 19.46 mt 3.25 ab 39.82 il 1.37 an 14.18 ap 1.34	Striegau, Silesia.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 34, 1909.	Border of schlieren in granite.	Cf. No. 56, II.5.2.3 and No. 182, I.4.1.3.
72	II.5.2.4.⊙	Q 2.04 di 2.54 or 17.24 hy 15.22 ab 41.92 mt 4.57 an 11.40 il 1.52 ap 1.34	Hohenberg, n. Reichenberg, Riesengebirge.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 42, 1909.	Schlieren in granite.	
73	''II.5.2.(3).4.	Q 4.38 hy 3.90 or 26.69 ol 0.91 ab 39.30 hm 5.67 an 11.12 tn 1.96 ru 0.32 ap 2.69	Tscheboner Berg, Buchau, Bohemia.	A. Krehan.	A. Krehan, Jb. G. R.-A. Wien, LXII, p. 37, 1912.	Trachy- andesite.	Iron oxides?
74	(I)II.''5.2(3).''4.	Q 6.60 di 1.30 or 21.13 hy 2.40 ab 38.77 mt 1.39 an 16.96 il 1.98 hm 3.68 ap 1.34	Ziegenberg, Nestersitz, Bohemia.	F. Hanusch.	J. E. Hibschi, T. M. P. M., XXIV, p. 303, 1905.	Boetonite.	
75	II.5(6).2.''4.	or 20.57 di 12.82 ab 26.98 ol 3.27 an 15.57 mt 7.66 ne 8.66 il 1.82 ap 2.69	Rongstock, Bohemia.	R. Pfohl.	J. E. Hibschi, * T. M. P. M., XIX, p. 55, 1900.	Essexite.	Mean of several analyses. Not in W. T.
76	II.''5.2.''4	Q 4.50 di 17.71 or 15.01 hy 1.80 ab 31.96 ol 4.71 an 12.79 hm 7.33 tn 0.14 ap 1.34	Alwernia, n. Cracow, Galicia.	Z. Rosen.	Z. Rosen, B. Ac. Sc. Crac., 1909, 1835	Melaphyre.	Iron oxides?
77	II(III).5.2(3).''4.	Q 1.68 di 21.17 or 15.57 wo 1.28 ab 31.96 ol 3.30 an 13.62 hm 8.40 ap 1.34	Regulice, n. Cracow, Galicia.	Z. Rosen.	Z. Rosen, B. Ac. Sc. Crac., 1909, p. 837.	Melaphyre.	Iron oxides?
78	II.5.''(1)2.4''.	or 12.79 di 12.17 ab 47.16 ol 2.80 an 5.56 mt 10.44 ne 6.25	Rettenbachklamm, Schöckel, Styria.	L. Welisch.	L. Welisch, Mt. Nw. Ver. Steierm., XLVII, p. 76, 1911.	Diabase.	
79	(I)II.5.2.''4.	Q 4.62 di 4.05 or 23.91 hy 5.86 ab 45.59 mt 1.62 an 12.23 il 1.22	Monte Mulatto, Predazzo, Tyrol.	J. A. Ippen.	J. A. Ippen, Sb. Wien Ak., CXI, I, p. 260, 1902.	Cancrinite- nephelinite syenite.	Norm and mode. Name correct?

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
80	52.73	16.85	5.23	4.43	2.64	5.86	5.44	3.86	3.14						100.18	
A3. III	.879	.165	.033	.061	.066	.105	.088	.041								
81	62.80	15.55	1.44	2.52	2.67	3.43	5.60	3.95	0.89	0.05	0.91				99.81	2.72
A3. III	1.047	.152	.009	.035	.067	.061	.090	.042			.011				(99.75)	
82	62.61	16.66	0.89	3.22	3.02	1.75	4.80	4.08	2.66	0.16	0.62				100.48	2.68
A3. III	1.044	.163	.006	.044	.076	.031	.077	.043			.008					
83	57.50	16.18	3.22	3.47	3.28	4.92	4.80	3.36	1.76	0.24	1.27				100.00	2.90
A3. III	.958	.159	.020	.049	.082	.088	.077	.036			.016					
84	60.99	15.93	1.80	3.82	1.92	3.91	5.11	3.75	1.88	0.09	0.65				99.85	2.78
A3. III	1.017	.156	.011	.053	.048	.070	.082	.040			.008					
85	55.18	17.12	6.97	1.47	4.01	3.79	4.85	3.10	1.25	0.06	1.84				99.65	2.82
A3. III	.920	.168	.044	.021	.100	.068	.078	.033			.023					
86	54.48	14.14	2.68	4.86	7.74	4.80	4.76	2.27	2.59	0.26	1.49				100.07	2.84
A3. III	.908	.139	.017	.068	.194	.086	.077	.024			.019					
87	53.65	14.29	1.01	6.01	6.00	6.90	4.33	3.48	1.65	0.09	1.78	0.86			100.05	2.82
A2. II	.894	.140	.006	.083	.150	.123	.069	.037			.022	.006				
88	52.87	15.44	6.15	4.86	4.59	5.55	4.93	1.75	1.47		2.32				99.93	2.86
A3. III	.881	.151	.039	.068	.115	.099	.079	.019			.029					
89	52.12	14.70	6.16	6.08	4.68	6.78	4.67	1.47	1.47	0.11	1.75	0.09			100.08	2.92
A2. II	.869	.144	.039	.085	.117	.121	.076	.016			.022	—				
90	55.78	16.98	4.07	3.43	3.61	2.52	5.05	3.33	3.04	0.17	1.54				99.52	2.77
A3. III	.930	.167	.025	.047	.090	.045	.082	.035			.019					
91	59.18	18.17	6.06	0.32	2.42	3.31	6.46	3.59	0.39		1.08				100.98	
B3. IV	.986	.178	.038	.004	.061	.059	.104	.038			.014					
92	56.14	20.20	4.53	1.27	1.26	4.99	6.39	2.80	1.51		0.82				99.91	
A3. III	.936	.198	.028	.018	.032	.089	.103	.030			.010					
93	52.67	15.35	3.82	5.42	4.40	5.91	4.50	2.68	0.37	0.14	4.04	0.75	trace	NiO CuO	none none	100.05
A2. II	.878	.150	.024	.075	.110	.105	.073	.029			.051	.005	—			
94	50.15	15.21	1.54	7.32	7.54	7.18	4.31	2.59	0.35	0.12	3.37	0.67			100.35	
A2. II	.836	.149	.010	.102	.189	.128	.070	.028			.042	.005				
95	53.58	19.78	3.91	2.76	3.01	7.55	5.33	3.61	0.65						100.18	
A3. III	.893	.194	.024	.039	.075	.135	.085	.038								
96	57.67	19.17	4.55	0.99	1.22	3.94	6.84	3.35	1.77		0.40	0.34		S	0.06	100.30
A2. II	.961	.188	.029	.014	.031	.070	.110	.036			.005	.002				2.607

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
80	II.5(6).2."4.	or 22.80 di 15.47 ab 30.65 ol 2.04 an 10.01 mt 7.66 ne 8.88	Pizmeda, Tyrol.	J. A. Ippen.	J. A. Ippen, N. J. Cb., 1904, p. 429.	Allochetite.	
81	"II."5.(1)2."4.	Q 5.52 di 9.08 or 23.35 hy 4.36 ab 47.16 mt 2.09 an 5.56 il 1.67	Piz Scantschallas, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Hornblende aplite.	
82	(I)II.(4)5.2.(3)4.	Q 9.36 hy 11.56 or 23.91 mt 1.39 ab 40.35 il 1.22 an 8.62 C 1.22	Crap Grond, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Diorite aplite.	
83	II.5.2."4.	Q 3.06 di 9.26 or 20.02 hy 5.32 ab 40.35 mt 4.64 an 12.79 il 2.43	Crap Grond, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Diorite porphyrite.	Border of No.70, II.5.2.3.
84	"II."5.2."4.	Q 5.94 di 8.26 or 22.24 hy 5.21 ab 42.97 mt 2.55 an 9.45 il 1.22	Piz Ner, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Syenite porphyry.	
85	II.5.2"4.	Q 1.74 di 1.94 or 18.35 hy 9.10 ab 40.87 il 3.19 an 15.85 hm 6.87 tn 0.39	Brichplankenslock, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Kersantite.	
86	II"5.2.4.	or 13.34 di 10.59 ab 40.35 hy 8.58 an 10.56 ol 7.14 mt 3.94 il 2.89	Piz Posta Bialla, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Spessartite.	
87	II"5.2.(3)4.	or 20.57 di 15.48 ab 34.06 ol 10.70 an 9.45 mt 1.39 ne 1.14 il 3.34 ap 2.02	Gliemstöckli, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Syenite.	
88	II.5.2(3).4.	Q 1.92 di 9.94 or 10.66 hy 6.90 ab 41.39 mt 9.05 an 14.73 il 4.41	Piz Dadens, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Luciite.	
89	II(III).5.2(3).4"	Q 0.18 di 15.28 or 8.90 hy 7.58 ab 89.82 mt 9.05 an 14.46 il 3.34	Samvis, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Diorite.	
90	II.5.2.4.⊙	Q 2.70 hy 9.40 or 19.46 mt 5.80 ab 42.97 il 2.89 an 12.51 C 0.51	Sustenjoch, Aarmassif, Switzerland.	O. Fischer.	O. Fischer, T. M. P. M., XXIV, p. 92, 1905.	Diorite porphyrite.	
91	(I)II.5.2.4.	or 21.13 di 2.81 ab 54.49 hy 0.40 an 10.01 ol 3.08 il 0.61 hm 6.06 tn 1.96	Semaforo, Ustica, Aeolian Islands.	A. Martelli.	A. Martelli, Mem. Soc. It. Sc., XVII, p. 164, 1912.	Andesite.	Iron oxides?
92	(I)II.5.2"4.	or 16.68 di 5.18 ab 48.21 ol 0.56 an 18.07 mt 1.86 ne 3.12 il 1.52 hm 3.20	Semaforo, Ustica, Aeolian Islands.	A. Martelli.	A. Martelli, Mem. Soc. It. Sc., XVII, p. 164, 1912.	Andesite.	
93	II.5.2"4.	Q 1.20 di 8.64 or 16.12 hy 7.00 ab 38.25 mt 5.57 an 13.34 il 7.75 ap 1.68	Monte San Mateo, Ploaghe, Sardinia.	H. S. Washing- ton.	H. S. Washington, Q. J. G. S. LXIII, p. 74, 1907.	Basalt.	
94	II(III).5"2"4.	or 15.57 di 13.34 ab 28.30 ol 13.75 an 14.18 mt 2.32 ne 4.54 il 6.38 ap 1.68	Monte Lisiri, Itirreddu, Sardinia.	H. S. Washing- ton.	H. S. Washington, unpublished.	Basalt.	
95	II.5(6).2(3).4.	or 21.13 di 14.17 ab 27.77 ol 1.95 an 19.74 mt 5.87 ne 9.09	Beresowska, Perm, Russia.	Loewinson- Lessing.	F. Loewinson-Lessing, Jushno Saosk., p. 244, 1900.	Syenite- diorite.	In W. T., p. 265.
96	(I)II.5.2.4.	or 20.02 di 4.54 ab 51.61 ol 0.70 an 11.68 mt 4.64 ne 3.27 il 0.76 hm 1.44 ap 0.67	Gran Curral, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 415, 1912.	Gauteite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
97	55.54	18.20	5.92	1.14	1.32	5.64	6.44	2.30	2.35		0.71	0.56		S 0.06	100.18	2.628
A2. II	.926	.178	.037	.016	.033	.101	.104	.024			.009	.004				
98	52.75	18.29	4.68	4.33	2.15	7.39	5.66	2.29	0.75		0.94	0.71		S 0.05	99.98	2.770
A2. II	.879	.179	.029	.060	.054	.132	.091	.024			.012	.005				
99	48.85	16.53	5.85	5.68	2.95	6.51	5.49	2.91	1.48		2.30	0.83	trace	SO ₂ 0.24	99.83	2.786
A2. II	.814	.162	.037	.079	.074	.116	.089	.031			.029	.006	—			
100	57.0	18.1	4.3	1.9	2.5	6.0	6.2	2.70	0.8		1.2				100.7	
B3. IV	.950	.177	.027	.026	.063	.107	.100	.029			.015					
101	60.96	16.24	2.50	3.52	2.69	5.77	5.13	2.48	1.10		0.45	0.09	trace	CO ₂ trace	100.93	
B2. III	1.016	.159	.016	.049	.067	.103	.082	.027			.006	—	—			
102	58.67	17.68	2.21	3.85	3.28	4.82	5.86	3.27	0.49		trace	0.57			100.70	
A3. III	.978	.173	.014	.054	.082	.086	.095	.035			—	.004				
103	58.67	16.21	4.17	3.54	3.19	6.29	5.09	1.89	1.29		0.19	0.25	0.15	CO ₂ trace	100.93	
A2. II	.978	.159	.026	.049	.080	.113	.082	.020			.002	.002	.002			
104	48.06	16.80	6.43	6.52	5.62	6.03	5.37	2.04	2.43		0.39	0.44	trace	CO ₂ FeS ₂ trace 0.63	100.76	
A2. II	.801	.165	.040	.090	.141	.107	.087	.021			.005	.003	—			
105	58.39	18.11	2.55	2.65	1.11	3.90	6.24	3.74	0.94	0.57	1.18	0.30			99.68	
A2. II	.973	.177	.016	.037	.028	.070	.101	.039			.015	.020				
106	56.90	19.24	3.57	0.78	0.84	4.71	5.98	4.99	0.57	0.15	1.40	0.25	0.20		99.58	
A2. II	.948	.189	.022	.011	.021	.084	.097	.053			.018	.002	.003			
107	56.25	20.50	1.85	4.23	2.54	3.62	5.91	4.80	0.83		0.63				101.16	
B3. IV	.938	.201	.012	.058	.064	.064	.095	.051			.008					
108	55.95	18.60	2.60	5.22	3.17	3.97	5.15	4.00	0.50		0.45				99.61	
A3. III	.933	.182	.016	.072	.079	.071	.083	.043			.006					
109	51.80	17.90	3.10	4.36	3.72	6.59	4.74	3.65	2.87		1.41				100.14	
A3. III	.863	.175	.019	.061	.093	.118	.076	.039			.018					
110	59.95	17.47	2.59	3.15	1.18	3.25	6.38	2.98	1.04		1.57	0.02			99.58	
A2. II	.999	.171	.016	.044	.030	.058	.103	.032			.020	—			(99.88)	
111	53.04	17.34	2.12	6.96	2.49	5.86	5.61	3.00	0.37		2.12	0.83			99.74	
A2. II	.884	.170	.013	.097	.062	.105	.090	.032			.027	.006				
112	55.49	16.29	4.81	3.90	1.86	3.87	5.50	4.63	0.52		1.77	0.41	trace	ZrO ₂ 0.48 SO ₂ 0.34	99.87	2.680
A2. II	.925	.160	.030	.054	.047	.070	.089	.049			.022	.003	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
97	"II.5.2.4.	or 13.34 di 7.13 ab 52.92 wo 0.46 an 13.90 ol 1.62 ne 0.85 il 1.37 hm 4.80 ap 1.34	Serrado, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Trachy- dolerite.	
98	II.5.2(3).4.	or 13.34 di 11.44 ab 40.87 ol 1.73 an 17.79 mt 6.73 ne 3.68 il 1.32 ap 1.68	Ribeira de Massapez, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Trachy- dolerite.	
99	II.5(6).2.4.	or 17.24 di 11.92 ab 31.44 ol 2.47 an 11.68 mt 8.58 ne 8.24 il 4.41 ap 2.02	Barranco del Diablo, Caldera La Palma, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 399, 1912.	Essexite.	
100	II.5.2.4.⊙	or 16.12 di 12.74 ab 47.16 ol 0.28 an 13.34 mt 2.55 ne 2.84 il 2.28 hm 2.56	Gebel Doukhan, Egypt.	J. Couyat.	J. Couyat, C. R., CXLVII, p. 869, 1908.	Labradorite (basalt).	
101	II."5.2".4.	Q 6.90 di 11.93 or 15.01 hy 4.48 ab 42.97 mt 3.71 an 13.90 il 0.91	Piano di Gher, Molebso, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 102, 1909.	Malchite.	
102	II.5.2.4.⊙	or 19.46 di 6.80 ab 49.78 hy 1.33 an 11.95 ol 6.43 mt 3.25 ap 1.34	Hali Baret, Cheren, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 61, 1909.	Granite.	
103	II."5.2(3).4.	Q 6.00 di 10.93 or 11.12 hy 5.78 ab 42.97 mt 6.03 an 15.85 il 0.30 ap 0.67	Digsa, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 68, 1909.	Quartz diorite.	
104	II".5(6).2".4.	or 11.68 di 8.96 ab 31.96 ol 11.34 an 15.85 mt 9.28 ne 7.38 il 0.76 ap 1.01	Valle Derré, Saganeiti, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 106, 1909.	Hornblende kersantite.	
105	(I)II.5.2.4.	or 21.68 di 5.78 ab 52.92 hy 0.83 an 10.29 mt 3.71 il 2.28 ap 0.67	Tsiafakafo, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 176, 1913.	Hornblende trachyte.	
106	(I)II.5".2.(3)4.	or 29.47 di 4.54 ab 39.82 wo 1.51 an 10.84 il 2.13 ne 5.96 hm 3.57 pf 0.54 ap 0.67	Andranonatoa, Itasy, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 179, 1913.	Trachyte.	
107	(I)II.5".2.(3)4.	or 28.36 di 2.04 ab 35.11 ol 7.63 an 15.29 mt 2.78 ne 7.95 il 1.22	Ambodimadiro, Ampasindava, Madagascar.	A. Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 110, 1902.	Micromon- zonite (latite).	
108	"II.5.2."4.	or 28.91 di 3.43 ab 41.13 ol 8.37 an 15.57 mt 3.71 ne 1.28 il 0.91	Ampangarinana, Nosy Komba, Madagascar.	A. Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 19, 1902.	Ditroite.	
109	II.5".2".4.	or 21.68 di 12.91 ab 27.77 ol 4.51 an 16.68 mt 4.41 ne 6.53 il 2.74	Bekinkina, Ambavatovy, Madagascar.	A. Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 229, 1903.	Essexite- monchi- quite.	Fresh?
110	(I)II.5.2.4.	Q 3.42 di 4.91 or 17.79 hy 1.70 ab 53.97 mt 3.71 an 10.01 il 3.04	Bras Rouge, Cilaos, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 541, 1912.	Akerite.	
111	II.5.2.4.⊙	or 17.79 di 8.57 ab 39.30 ol 6.99 an 13.34 mt 3.02 ne 4.26 il 4.10 ap 2.02	Bellouve, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 541, 1912.	Olivine trachy- andesite.	
112	II.5.(1)2.(3)4.	or 27.24 di 8.27 ab 42.97 ol 0.77 an 6.12 mt 6.96 ne 1.99 il 3.34 ap 1.01	East Mavenzi, Kilimanjaro, German East Africa.	C. Klüss.	L. Finckh, Z. D. G. G., LKV, p. 460, 1913.	Pulaskite.	"ZrO ₂ by color with H ₂ O ₂ ."

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
113	53.18	17.65	5.52	3.50	2.22	5.33	5.64	3.04	1.62		1.52	0.57	trace	SO ₂ 0.06 S 0.06	99.91	2.667
A2. II	.886	.173	.034	.049	.056	.095	.091	.032			.019	.004				
114	50.27	18.91	4.08	5.35	2.04	5.94	5.19	5.34	2.15		1.90	0.80		S 0.10	100.07	2.684
A2. II	.838	.185	.026	.075	.051	.106	.084	.035			.024	.006				
115	49.69	17.02	4.28	7.34	3.15	6.73	4.67	2.73	1.19		2.13	0.65		ZrO ₂ 0.36 SO ₂ 0.30	100.24	
A2. II	.828	.167	.027	.102	.079	.120	.076	.029			.027	.005				
116	56.80	17.81	1.40	4.84	1.34	5.21	6.15	2.81	1.60		1.61	0.45			100.02	
A2. II	.947	.175	.009	.067	.034	.093	.099	.030			.020	.003				
117	52.54	14.77	4.68	3.57	5.37	8.06	4.46	2.86	0.14	0.84	2.95	0.68	trace	F 0.34	101.26	2.794
B2. III	.876	.145	.029	.050	.134	.144	.072	.031			.037	.005	—			
118	59.30	16.61	1.51	5.02	1.55	3.16	5.63	4.41	0.95		1.11	0.44	0.21		99.90	
A2. II	.988	.163	.009	.069	.039	.056	.090	.047			.014	.003	.003			
119	57.14	18.05	2.80	2.59	1.42	4.03	5.27	4.71	2.06		1.82	0.59	trace		100.48	
A2. II	.952	.177	.018	.036	.036	.071	.085	.050			.023	.004	—			
120	49.70	13.24	8.60	4.05	3.21	6.31	5.28	1.90	4.00		3.35	0.26			99.90	
A2. II	.828	.130	.054	.057	.080	.113	.085	.020			.042	.002				
121	60.2	17.8	3.9	1.5	1.6	6.1	6.2	1.7	1.0						100.0	
B3. IV	1.003	.175	.024	.021	.040	.109	.100	.018								
122	53.94	19.25	4.16	2.70	1.83	10.70	5.55	2.49	0.27						100.89	2.732
A3. III	.899	.189	.026	.038	.046	.191	.090	.027								
123	52.95	15.56	2.62	7.29	2.89	4.92	4.46	2.94	2.18	0.75	1.84	1.15	0.14		99.69	2.74
A2. II	.883	.153	.016	.101	.072	.088	.072	.031			.023	.008	.002			
124	56.63	17.71	3.61	4.64	1.47	4.06	5.11	3.65	0.70	0.49	2.00	trace	0.03	CO ₂ 0.01 ZrO ₂ 0.06 NiO none BaO none SrO none	100.17	
A1. I	.944	.174	.023	.064	.037	.072	.082	.039			.025	—	—			
125	55.19	16.18	3.52	3.94	3.04	4.68	5.09	4.10	1.75	0.99	0.89	0.59	0.18	CO ₂ 0.28 ZrO ₂ none SO ₂ 0.05 Cl 0.02 Cr ₂ O ₃ none V ₂ O ₅ 0.03 NiO none CuO 0.01 BaO 0.07 SrO trace Li ₂ O trace	100.60	2.800
A1. I	.920	.159	.022	.054	.076	.084	.081	.044			.011	.004	.002			
126	51.88	14.20	3.72	6.87	4.62	6.36	3.93	3.27	1.44	0.58	3.54	trace	0.02	CO ₂ 0.29 SO ₂ 0.04 Cl trace NiO 0.04 BaO none SrO none	100.80	
A1. I	.885	.139	.023	.096	.116	.114	.063	.035			.044	—	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. AKEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
113	II.5.2.4.⊙	or 17.79 di 6.91 ab 44.01 ol 1.68 an 13.90 mt 6.96 ne 1.99 il 2.89 hm 0.64 ap 1.34	Loo Malassin Volcano, German East Africa.	C. Klüss.	L. Finckh, Z. D. G. G., LXV, p. 500, 1913.	Basaltoid trachy- dolerite.	
114	II.5''2(3).4.	or 19.44 di 4.51 ab 34.06 ol 4.53 an 13.35 mt 6.03 ne 5.40 il 3.65 ap 2.02	Kibo, Kilimanjaro, German East Africa.	C. Klüss.	L. Finckh, Z. D. G. G., LXV, p. 500, 1913.	Basaltoid trachy- dolerite.	
115	II.5.2(3).4.	or 16.12 di 9.37 ab 33.01 ol 7.04 an 17.24 mt 6.26 ne 3.69 il 4.10 ap 1.68	Mavenzi, Kilimanjaro, German East Africa.	C. Klüss.	L. Finckh, Z. D. G. G., LXV, p. 469, 1913.	Essexite.	"ZrO ₂ by color with H ₂ O ₂ ."
116	''II.5.2.4.	or 16.68 di 8.60 ab 50.30 ol 3.06 an 12.79 mt 2.09 ne 0.85 il 3.04 ap 1.01	Leeuwfontein, Pretoria, Transvaal.	F. Pisani.	H. A. Bröuwer, Transv. Neph., p. 81, 1910.	Leeuwfonteinite (akerite).	
117	II(III).5.2.4.	or 17.24 di 18.36 ab 35.11 ol 3.43 an 11.68 mt 3.02 ne 1.42 il 5.62 hm 2.56 ap 1.68	Bering Island, Commander Islands, Bering Sea.	Z. Starzynki.	Z. Starzynki, B. Ac. Sci. Crac., 1912, p. 671.	Beringite (amphibole andesite).	
118	''II.5.''2.(3).4.	Q 0.36 di 4.67 or 26.13 hy 8.02 ab 47.16 mt 2.09 an 7.23 il 2.13 ap 1.01	Sulphur Island, Japan.	K. Yokoyama.	S. Kozu, pers. com.	Oligoclase andesite.	
119	(I)II.5.2.(3).4.	Q 0.36 di 3.46 or 27.80 hy 2.00 ab 44.54 mt 3.02 an 11.68 il 3.50 hm 0.80 ap 1.34	Miniura, Dozen, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, pers. com.	Plagioclase trachyte.	
120	II(III).5.2.4.	or 11.12 di 17.28 ab 42.97 mt 3.48 an 6.95 il 6.38 ne 0.85 hm 6.24 ap 0.67	Won-low-si-chou, East Yunnan, China.	Pisani.	J. Deprat, Mem. Sv. G. Indo-Ch., I (1), p. 231, 1912.	Andesite.	
121	(I)II.5.2''4(5).	Q 5.34 di 8.64 or 10.01 wo 1.39 ab 52.40 mt 4.87 an 15.85 hm 0.48	Sago Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 23, 1903.	Andesite.	
122	II.5(6).2(3).4.	or 15.01 di 12.91 ab 30.92 wo 7.08 an 20.02 mt 6.03 ne 8.80	Rau Rau, Merapi Volcano, Sumatra.	A. Clausnizer.	R. D. M. Verbeek, Sum. Westk., p. 513, 1883.	Augite andesite.	Not in W. T.
123	II.5.2''4.	Q 1.08 di 2.54 or 17.24 hy 14.39 ab 37.73 mt 3.71 an 13.90 il 3.50 ap 2.09	Spicers Peak, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Oligoclase basalt.	H. C. Richards, pers. com.
124	''II.5.2.''4.	Q 2.40 di 4.29 or 21.88 hy 3.72 ab 42.97 mt 5.34 an 14.73 il 3.80	Oakey Creek, Nandewar Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 904, 1908.	Akerite.	
125	II.5.2.''4.	or 24.46 di 8.25 ab 42.44 ol 4.61 an 9.45 mt 5.10 il 1.67 ap 1.35	Jamberoo, Kiama, New South Wales.	J. C. H. Mingaye.	Jaquet, Card and Harper, Rec. G. S. N. S. W., VIII, p. 12, 1905.	Orthoclase basalt.	
126	II(III).5.2'' (3).4.	or 19.46 di 16.25 ab 33.01 hy 2.76 an 11.40 ol 3.51 mt 5.34 il 6.69	Tondurou, Warrumbungle Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 616, 1908.	Orthoclase basalt.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
127	56.85	14.76	4.48	1.21	3.84	7.91	5.34	1.91	0.12	0.08	3.11	0.51	0.12	CO ₂ none ZrO ₂ trace SO ₃ none Cl F 0.04 Cr ₂ O ₃ none NiO 0.05 BaO none SrO 0.01 Li ₂ O none	100.34	
A1. I	.948	.145	.028	.017	.096	.141	.086	.020			.039	.004	.002			
128	49.39	14.86	7.35	5.42	5.62	7.08	4.71	2.54	2.52			0.20			99.69	
A3. III	.823	.146	.046	.075	.141	.127	.076	.027				.001				
129	58.06	18.21	4.87	2.01	1.59	3.29	6.12	2.75	(0.83)	(0.53)	1.88	0.65	0.36	SO ₃ 0.05 S 0.05 CuO 0.10	99.99	
A?1. I	.968	.178	.031	.028	.040	.059	.098	.030			.024	.005	.005			
130	51.26	16.74	2.92	7.11	2.80	6.61	5.86	2.25	0.42	0.26	2.57	0.81	0.23	ZrO ₂ none Cr ₂ O ₃ none NiO none BaO 0.10 SrO 0.09	100.03	
A1. I	.854	.164	.018	.099	.070	.118	.095	.023			.032	.006	.003			
131	49.55	17.78	4.65	5.89	2.49	7.01	6.12	2.29	0.34	0.29	2.09	1.10	0.28	CO ₂ none ZrO ₂ 0.01 FeS ₂ 0.03 Cr ₂ O ₃ none V ₂ O ₅ 0.02 NiO none BaO 0.05 SrO 0.08 Li ₂ O none	100.07	
A1. I	.824	.174	.029	.082	.062	.125	.098	.024			.026	.008	.004			
132	58.92	16.95	3.33	3.69	0.40	6.22	4.99	3.08	1.27	1.09					99.94	
A3. III	.982	.166	.021	.051	.010	.111	.081	.033								
133	52.36	14.20	5.80	6.68	3.09	7.40	5.42	2.06	1.57		2.40				100.98	
B3. IV	.873	.139	.036	.093	.077	.132	.087	.022			.030					
134	46.18	16.82	2.08	13.46	5.68	4.81	5.02	1.83	0.82	0.89	0.51	1.05	0.27	CO ₂ 0.31	99.73	2.88
A2. II	.770	.165	.013	.187	.142	.086	.081	.019			.006	.008	.004			

RANG 2. DOMALKALIC. MONZONASE.

1	54.39	16.90	1.65	6.76	4.51	1.29	8.02	0.55	4.22	0.18	1.24	0.12			99.78	
A2. II	.906	.166	.010	.094	.113	.023	.129	.006			.016	.001				
2	60.44	16.26	0.07	3.52	1.75	7.86	7.13	0.44	0.38	0.29	1.33	0.58	0.06	CO ₂ none ZrO ₂ 0.06 FeS ₂ 0.10 NiO trace Li ₂ O none	100.27	
A1. I	1.007	.159	—	.049	.044	.140	.115	.005			.016	.004	.001			
3	50.09	15.84	7.44	3.80	4.98	3.54	7.50	1.10	3.67		1.70	0.32	trace	CO ₂ 0.34	100.32	
A2. II	.835	.155	.047	.053	.125	.063	.121	.012			.021	.002				
4	52.59	15.03	6.12	3.96	5.04	5.55	5.79	0.67	2.16	0.16	1.36	0.15	0.25	CO ₂ none	99.73	
A2. II	.877	.156	.038	.055	.126	.099	.093	.007			.016	.001	.004			
5	61.36	16.56	3.44	2.93	0.85	4.56	6.86	1.30	1.55					CO ₂ trace	99.41	2.63
A?3. III	1.023	.162	.022	.040	.021	.081	.111	.014								
6	57.43	17.69	1.59	3.48	2.73	5.72	7.19	0.58	1.81	0.48	0.66	0.17	0.17	CO ₂ 0.10 ZrO ₂ none S 0.02 BaO none SrO 0.02	99.84	
A1. I	.957	.173	.010	.049	.068	.102	.116	.006			.008	.001	.002			

ORDER 5. PERFELIC. GERMANARE—Continued

SUBRANG 4. DOSODIC. AKEROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
127	II.5.2.4.⊙	Q 2.94 dl 14.90 or 11.12 hy 2.70 ab 45.06 il 2.89 an 10.84 hm 4.48 tn 3.92 ap 1.34	Houghton, Hundred of Yatala, South Australia.	W. N. Benson.	W. N. Benson, Pr. R. Soc. S. Aust., XXXIII, p. 122, 1909.	Diorite.	
128	II(III).5(6).2.4.	or 15.01 di 17.95 ab 28.30 ol 6.71 an 11.95 mt 10.67 ne 6.26 ap 0.34	Otago, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 409, 1906.	Nephelite basanite.	
129	(I)II.5.2.4.	Q 4.56 hy 4.00 or 16.68 mt 2.09 ab 51.35 il 3.65 an 11.68 hm 3.52 C 0.82 ap 1.68	Kohala Mountain, Waimaea, Hawaii, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Andesite.	Calculated to 100 after de- ducting H ₂ O. In W. T., p. 265.
130	II.5''2.4.	or 12.79 di 11.93 ab 38.77 ol 5.86 an 12.79 mt 4.18 ne 5.96 il 4.86 ap 2.02	Ravine n. Vierira House, Maui, Hawaiian Islands.	G. Steiger.	W. Cross, U. S. G. S. P. P. 88, p. 31, 1915.	Essexitic andesite.	
131	II.5(6).2.4.	or 13.34 di 10.42 ab 34.84 ol 3.80 an 14.46 mt 6.73 ne 8.94 il 3.95 ap 2.69	Haleakala Crater, Maui, Hawaiian Islands.	W. F. Hille- brand.	W. Cross, U. S. G. S. P. P. 88, p. 31, 1915.	Esseritic andesite.	
132	''II.''5.2.4.	Q 5.76 di 9.60 or 18.35 wo 2.32 ab 42.44 mt 4.87 an 14.18	Namulowai, Fiji Islands.	Stoddard and Mawson.	W. G. Woolnough, Pr. Linn. Soc. N. S. W., XXVIII, p. 520, 1903.	Augite andesite.	
133	II(III).5.2.4.	or 12.23 di 22.86 ab 39.56 ol 0.17 an 8.34 mt 8.35 ne 3.26 il 4.56	Beeman Hill, Campbell Island.	P. Marshall.	P. Marshall, Subant. Islds., p. 696, 1909.	Basalt.	
134	II''5(6).2(3).4.	or 10.56 ol 27.48 ab 28.82 mt 3.02 an 16.40 il 0.91 ne 7.38 ap 2.69 C 0.61	Adams Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islds., p. 733, 1909.	Basalt.	

SUBRANG 5. PERSODIC. GRENADOSE. (H. S. WASHINGTON, 1917.)

1	II.5.(1)2.5.	or 3.34 ol 14.85 ab 62.88 mt 2.32 an 5.56 il 2.43 ne 2.56 ap 0.34 C 1.12	Wapus Creek, Gowganda Dis- trict, Ontario.	M. F. Connor.	W. H. Collins, Can. G. S. Mem. 33, p. 76, 1913.	Aplite.	
2	II.5.2.5.⊙	Q 2.58 di 17.94 or 2.78 wo 1.16 ab 60.26 il 2.43 an 10.84 ap 1.34	South Peru, Massachusetts.	W. T. Schaller.	U. S. G. S. B. 419, p. 24, 1910.	Pyroxene- titanite aplite.	
3	II.5(6).(1)2.''5.	or 6.67 di 7.34 ab 47.68 ol 6.30 an 6.12 mt 7.42 ne 8.52 il 3.19 hm 2.40 ap 0.67	Mattapan, Massachusetts.	W. T. Hall.	F. Bascom, pers. com.	Soda andesite.	
4	II.5.2(3)''5.	or 3.89 di 8.64 ab 48.73 hy 8.60 an 15.57 mt 8.82 il 2.43 ap 0.34	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, U. S. G. S. Mon., XXXVI, p. 106, 1899.	Metabasalt (diabase).	In W. T., p. 265.
5	(I)II.''5.2.(4)5.	Q 6.96 di 9.00 or 7.23 wo 0.53 ab 58.16 mt 5.10 an 10.29	Galena Mountain, Silverton, Colorado.	E. O. Cross.	F. R. Van Horn, B. G. S. A., XII, p. 8, 1901.	Hornblende andesite.	
6	II.5.2.5.⊙	or 3.34 di 10.88 ab 60.78 ol 4.25 an 14.18 mt 2.32 il 1.22 ap 0.34	Rogue River, Port Orford Quadrangle, Oregon.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Gabbro.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. MONZONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	60.80	16.34	0.68	5.14	1.47	6.92	6.71	1.12	0.37						99.55	2.71
A3. III	1.013	.160	.004	.071	.037	.123	.108	.012								
8	56.51	14.07	4.04	4.65	3.95	8.44	5.32	0.79	1.51		0.19	0.23	trace	CO ₂ none S trace	99.70	
A2. II	.942	.138	.025	.065	.099	.150	.085	.008			.002	.002	—			
9	62.08	16.19	2.10	3.05	5.62	1.77	5.94	1.57	1.35						99.67	
A3. III	1.035	.159	.013	.043	.141	.032	.096	.017								
10	50.52	13.98	0.49	0.16	0.34	1.05	6.18	1.00	0.30	0.20	25.00	trace	none	CO ₂ none S 0.12	99.34	
B2. III	.842	.137	.003	.002	.009	.019	.100	.011			.313	—	—		(99.33)	
11	52.04	16.28	6.18	5.69	4.14	5.33	6.41	1.19	0.39		1.67	0.40	0.03	S 0.08	99.83	
A2. II	.867	.160	.039	.079	.104	.095	.103	.013			.021	.003	—			
12	51.69	14.62	9.24	5.14	3.74	4.49	6.77	1.08	0.43	(0.08)	1.80	0.46	0.08	CO ₂ 0.38 S 0.02	99.94	
A2. II	.862	.143	.058	.071	.094	.080	.110	.012			.023	.003	.001			
13	58.28	16.42	6.02	2.75	1.94	4.26	7.90	0.14	1.72		0.58		0.12		100.13	
A2. II	.971	.161	.038	.039	.049	.076	.127	.001			.007		.002			
14	54.77	14.67	6.60	6.41	3.21	4.90	6.32	0.60	0.36	0.11	1.51		0.39	CO ₂ 0.10 SO ₂ 0.15	100.10	
A2. II	.913	.142	.041	.089	.080	.088	.102	.007			.019		.003			
15	52.82	15.98	2.07	6.88	4.20	6.74	6.44	1.23	0.69		2.82	0.10	0.31		100.28	2.87
A2. II	.880	.157	.013	.096	.105	.120	.104	.013			.035	.001	.004			
16	54.23	15.22	2.84	9.47	2.93	8.56	5.80	0.92	1.00						100.97	2.88
B3. IV	.904	.149	.017	.133	.072	.152	.093	.010								
17	60.62	16.22	1.76	5.67	1.62	4.18	6.67	0.78	0.56		1.54	0.24			99.86	
A2. II	1.010	.159	.011	.079	.041	.075	.108	.008			.019	.002				

RANG 3. ALKALICALCIC. ANDASE. (C. I. P. W., 1903.)

1	55.17	18.01	0.08	5.41	5.29	5.64	2.12	5.48	0.29	0.01	2.33	0.25		CO ₂ none	100.08	
A2. II	.920	.176	.001	.075	.132	.101	.034	.059			.029	.002			(100.86)	
2	51.21	18.28	3.07	4.19	3.47	7.86	2.49	6.60	0.56	0.16	1.43	0.35	trace	CO ₂ none ZrO ₂ none SO ₂ none BaO 0.10	99.77	
A1. I	.854	.179	.019	.058	.087	.140	.040	.070			.018	.003	—			
3	52.37	20.89	1.21	4.44	1.74	5.08	2.90	7.47	1.46	0.51	1.15	0.51	trace	CO ₂ none ZrO ₂ 0.07 SO ₂ none BaO 0.16	99.96	
A1. I	.873	.204	.008	.062	.044	.091	.047	.080			.014	.004	—			
4	50.86	18.48	4.03	3.45	2.55	7.77	2.23	7.15	1.51	0.16	1.00	0.46	trace	CO ₂ none ZrO ₂ none SO ₂ none BaO 0.17	99.84	
A1. I	.848	.181	.025	.048	.064	.139	.035	.077			.013	.003	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 5. PERSODIC. GRENADOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	II.5.2.(4)5.	Q 1.56 di 19.63 or 6.67 hy 2.55 ab 56.59 mt 0.93 an 11.12	Saba Island, West Indies.	T. Nordström.	P. T. Cleve, Sv. Vet. Ak. Hnrd., IX, No. 12, p. 39, 1871.	Andesite.	Cf. Högbom, B. G. Inst. Ups., VI, p. 230, 1905. Not in W. T.
8	II''5.2''5.	Q 3.54 di 22.03 or 4.45 hy 4.25 ab 44.54 mt 5.80 an 12.51 il 0.30 ap 0.67	Grenada Island, West Indies.	J. B. Harrison.	J. B. Harrison, Rocks and Soils of Grenada, p. 10, 1896.	Andesite.	In W. T., p. 265.
9	II.''5.2.(4)5.	Q 7.32 hy 18.06 or 9.45 mt 3.02 ab 50.30 an 8.90 C 1.43	Northwestern Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 54, 1907.	Trachy- andesite.	
10	II.(4)5.(1)2.''5.	Q 7.74 hy 0.90 or 6.12 il 0.30 ab 52.40 hm 0.48 an 5.26 ru 24.88 C 0.82	Krageroe, Norway.	J. W. Watson.	T. L. Watson, A. J. S., XXXIV, p. 512, 1912.	Kragerite (rutile- albite rock).	
11	II.5.2.(4)5.	or 7.23 di 9.05 ab 48.73 ol 6.16 an 12.23 mt 9.05 ne 2.84 il 3.19 ap 1.01	Koskull Kulle Mine, Gellivare, Sweden.	G. Nyblom.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Metabasite.	
12	II''5.(1)2.(4)5.	or 6.67 di 10.58 ab 53.45 ol 3.15 an 5.84 mt 11.37 ne 2.27 il 3.50 hm 1.44 ap 1.01	Sakaravaara, Lapland, Sweden.	R. Mauzelius.	P. Geijer, G. Kir. Dist., p. 198, 1910.	Syenite porphyry.	
13	II.5.2.5.⊙	Q 2.70 di 9.29 or 0.56 hy 0.60 ab 66.55 mt 7.89 an 9.17 il 1.06 hm 0.64	Niederkirchen, Rheinpfalz.	A. Schwager.	M. Schuster, Geog. Jhft., XIX (1906), p. 57, 1908.	Aplite.	
14	II.5.2.''5.	Q 2.34 di 10.14 or 3.89 hy 6.91 ab 53.45 mt 9.51 an 9.17 il 2.89 ap 1.01	Ludwigsteich, n. Rosdorf, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hess., Bl. Rosdorf, p. 24, 1912.	Diabase.	
15	II''5''2.(4)5.	or 7.23 di 17.46 ab 43.23 ol 6.43 an 11.12 mt 3.02 ne 6.10 il 5.32 ap 0.34	San Antonio, Valtellina, Lombardy.	Dittrich.	W. Rasch, N. J. B. B., XXXII, p. 216, 1911.	Diorite.	
16	II''5''2.(4)5.	or 5.56 di 24.82 ab 40.87 ol 7.54 an 12.79 mt 3.94 ne 4.26	Victoria Range, Westland, New Zealand.	W. A. MacLeod.	W. A. MacLeod, Tr. N. Z. Inst., XXXI, p. 487, 1899.	Dolerite.	In W. T., p. 265.
17	II.''5.2.5.	Q 6.78 di 5.85 or 4.45 hy 7.62 ab 56.59 mt 2.55 an 11.95 il 2.89 ap 0.67	Deception Island, South Shetland Islands, Antarctica.	Lassieur.	G. Gourdon, pers. com.	Andesite.	

SUBRANG 2. DOPOTASSIC. AURUNCOSE. (H. S. WASHINGTON, 1906.)

1	II.5.3.2(3).	Q 0.54 di 2.48 or 32.80 hy 17.94 ab 17.82 mt 0.23 an 23.07 il 4.41 ap 0.67	Campbell Pond, Lincoln County, Maine.	M. W. Adams.	I. H. Ogilvie, Ann. N. Y. Ac. Sci., XVII, p. 542, 1907.	Monzonite.	
2	II.5''3.2(3).	or 38.92 di 13.56 ab 9.17 ol 3.58 an 19.18 mt 4.41 ne 6.39 il 2.74 ap 1.01	Toscanelia, n. Lake Bolsena, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 86, 1906.	Leucite tephrite.	
3	(I)II.5''(2)3.2(3).	or 44.48 ol 7.16 ab 13.62 mt 1.86 an 21.41 il 2.13 ne 5.94 ap 1.34	Croce di San Mar- tino, Monte Vico, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 80, 1906.	Leucite tephrite.	
4	II.5''(2)3.2.	or 42.81 di 13.22 ab 6.81 ol 1.04 an 19.18 mt 5.80 ne 6.25 il 1.98 ap 1.01	Orchi, Rocca Monfina Volcano, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 83, 1906.	Leucite trachyte.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5	50.20	18.80	1.79	4.62	5.55	8.77	1.71	6.07	1.37		1.19	0.31			100.38	
A2. II	.837	.184	.011	.064	.139	.157	.027	.065			.015	.002				
6	53.5	20.0	2.5	3.7	2.2	7.9	1.1	6.2	2.4						99.5	
B3. IV	.892	.196	.016	.051	.055	.141	.018	.066								

RANG 3. ALKALICALCIC. ANDASE.

1	58.51	16.32	2.11	4.43	3.73	3.92	3.11	4.08	2.00	0.23	0.72	0.30	trace	CO ₂ Cr ₂ O ₃ NiO	none none none	99.46	
A2. II	.975	.160	.013	.061	.093	.070	.050	.043			.009	.002	—				
2	57.97	15.65	0.73	2.80	4.96	10.93	3.03	3.16	0.38	0.22	0.60	0.15	trace	Cl F BaO SrO Li ₂ O	trace trace 0.09 0.02 trace	100.69	
A1. I	.966	.153	.005	.039	.124	.195	.049	.034			.008	.001	—				
3	52.07	15.99	4.77	5.59	4.54	7.50	2.97	2.79	1.60	0.34	1.08	0.40		CO ₂	none	99.64	
A2. II	.868	.157	.030	.078	.114	.134	.048	.030			.014	.003					
4	51.00	17.21	4.23	2.41	6.19	9.15	2.88	4.93	0.63		0.13	0.33	trace	SO ₂ Cl BaO SrO	0.03 trace 0.34 0.14	99.60	
A1. I	.850	.169	.026	.033	.155	.163	.047	.053			.002	.002	—				
5	56.05	19.70	3.74	2.32	2.51	4.34	3.29	4.44	1.86		0.98	0.66	trace	SO ₂ Li ₂ O	0.19 0.06	100.14	
A2. II	.934	.193	.023	.032	.063	.078	.053	.047			.012	.005	—				
6	54.86	17.28	4.08	2.28	4.19	5.42	3.94	3.96	2.16		0.69	0.48	0.19	BaO	0.37	99.90	
A2. II	.914	.170	.025	.032	.105	.096	.063	.042			.009	.003	.003				
7	53.49	17.19	4.73	3.25	4.42	6.34	3.23	3.86	2.17		0.71	0.43	0.14	BaO	0.06	100.02	
A2. II	.892	.169	.029	.045	.111	.113	.052	.041			.009	.003	.002				
8	52.86	17.51	5.18	3.31	4.18	6.51	3.22	3.41	1.76		1.04	0.53	trace	SO ₂ Cl Li ₂ O	0.22 0.16 0.04	99.93	
A2. II	.881	.172	.032	.046	.105	.116	.051	.036			.013	.004	—				
9	52.49	17.89	5.76	2.08	3.49	7.01	3.18	3.73	2.63		0.81	0.55	0.09	BaO	0.30	100.01	
A2. II	.875	.175	.036	.030	.097	.125	.051	.039			.010	.004	.001				
10	52.93	19.67	3.07	3.50	2.88	4.69	4.20	4.75	2.73		0.72	0.59	0.15	BaO	0.21	100.09	
A2. II	.882	.193	.019	.049	.072	.084	.068	.051			.009	.004	.002				
11	51.56	21.00	5.17	2.76	2.52	4.83	4.37	4.13	2.27		0.65	0.69	trace	SO ₂ Cl Li ₂ O	0.21 trace 0.13	100.29	
A2. II	.859	.206	.032	.039	.063	.086	.071	.044			.008	.005	—				
12	52.11	16.58	3.66	4.99	6.87	6.43	3.25	3.20	1.99		0.53	0.63	0.23			100.47	
A2. II	.869	.163	.023	.070	.172	.115	.052	.034			.006	.004	.003				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 2. DOPOTASSIC. AURUNCOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	II.5''3.2.	or 36.14 di 12.98 ab 4.19 ol 2.16 an 25.58 mt 2.55 ne 5.40 il 2.28 ap 0.67	Monte Somma, n. Naples, Italy.	A. Pisani.	A. Lacroix, C. R., CXLI, p. 1190, 1905.	Sommaite (leucite monzonite).	
6	''II.5.3''2.	Q 2.70 di 6.61 or 36.70 hy 6.87 ab 9.43 mt 3.71 an 31.14	Gebel Aroudjaoud, n. Cherchel, Algeria.	Not stated.	Termier and de Lapparent, C. R., CL, p. 1486, 1910.	Monzonite.	

SUBRANG 3. SODIPOTASSIC. SHOSHONOSE. (C. I. P. W., 1903.)

1	II.(4)5.(2)3.3.	Q 9.54 hy 14.45 or 23.91 mt 3.02 ab 26.20 il 1.37 an 17.51 ap 0.67 C 0.41	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, J. G., VI, p. 378, 1898.	Mica diorite.	Also in U. S. G. S. Mon. 36, p. 231, 1899. In W. T., p. 267.
2	II''5.3.3''.	Q 3.36 di 27.02 or 18.90 hy 2.96 ab 25.68 mt 1.16 an 19.46 il 1.22 ap 0.34	Rock Creek, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 144, 1897.	Diorite.	In W. T., p. 267.
3	II''5.3.3(4).	Q 2.94 di 10.04 or 16.68 hy 11.07 ab 25.15 mt 6.96 an 21.96 il 2.28 ap 1.01	Mount Belmont, Marysville Dis- trict, Montana.	G. Steiger.	J. S. Barrell, U. S. G. S. P. P. 57, p. 45, 1907.	Diorite.	
4	II.5(6)3.3.	or 29.47 di 18.48 ab 12.05 ol 5.24 an 19.13 mt 6.03 ne 6.82 il 0.30 ap 0.67	Highwood Peak, Highwood Moun- tains, Montana.	E. B. Hurlbut.	L. V. Pirsson, U. S. G. S. B. 237, p. 79, 1905.	Monzonite.	In W. T., p. 267.
5	(I)II.(4)5.(2)3.3.	Q 9.06 hy 6.30 or 26.13 mt 4.64 ab 27.77 il 1.82 an 16.68 hm 0.48 C 3.37 ap 1.68	Two Ocean Pass, Yellowstone National Park.	J. E. Whit- field.	J. P. Iddings, J. G., III, p. 944, 1895.	Shoshonite.	Also in U. S. G. S. Mon. 32 (II), p. 340, 1899. In W. T., p. 267.
6	II.5.(2)3.3(4).	Q 1.68 di 4.54 or 23.35 hy 8.40 ab 33.01 mt 5.34 an 18.07 il 1.37 hm 0.32 ap 1.01	Indian Peak, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 944, 1895.	Shoshonite.	Also in U. S. G. S. Mon. 32 (II), p. 340, 1899. In W. T., p. 267.
7	II.5.3.3⊙	Q 2.10 di 5.89 or 22.80 hy 9.52 ab 27.25 mt 6.73 an 21.13 il 1.37 ap 1.01	Beaverdam Creek, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 944, 1895.	Shoshonite.	Also in U. S. G. S., Mon. 32(II), p. 340, 1899. In W. T., p. 267.
8	II.5.3.3''.	Q 3.78 di 4.41 or 20.02 hy 8.86 ab 26.72 mt 7.42 an 23.63 il 1.82 ap 1.34	Beaverdam Creek, Yellowstone National Park.	J. E. Whit- field.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 340, 1899.	Shoshonite.	In W. T., p. 267.
9	II.5.3.3⊙	Q 3.06 di 5.83 or 21.68 hy 6.00 ab 26.72 mt 4.87 an 23.63 il 1.52 hm 2.40 ap 1.34	Near Pyramid Peak, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 944, 1895.	Leucite? shoshonite.	Also in U. S. G. S. Mon. 32, (II), p. 340, 1899. In W. T., p. 267.
10	(I)II.5.(2)3.3''.	or 28.36 ol 7.39 ab 32.75 mt 4.41 an 19.74 il 1.37 ne 1.56 ap 1.34 C 0.31	Beaverdam Creek, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 947, 1895.	Leucite banakite.	Also in U. S. G. S. Mon. 32, (II), p. 349, 1899. In W. T., p. 267.
11	(I)II.5.(2)3.3(4).	or 24.46 ol 4.41 ab 37.20 mt 7.42 an 19.18 il 1.22 C 2.24 ap 1.68	Beaverdam Creek, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 349, 1899.	Leucite banakite.	Same rock as No. 10 above. In W. T., p. 267.
12	II''5.3.3(4).	or 18.90 di 5.56 ab 27.25 hy 11.40 an 21.41 ol 6.42 mt 5.34 il 0.91 ap 1.34	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 260, 1899.	Orthoclase basalt.	In W. T., p. 267.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13	51.75	17.48	6.42	1.46	4.05	8.20	3.33	3.72	2.26		0.86	0.67	trace	SO ₃ 0.17 Cl trace	100.37	
A2. II	.863	.172	.040	.020	.101	.146	.054	.039			.011	.005	—			
14	51.17	16.14	4.11	4.48	4.82	7.72	2.99	3.54	2.24	0.63	1.01	0.48	0.21	ZrO ₂ none FeS ₂ 0.05 V ₂ O ₅ trace NiO 0.04 BaO 0.01 SrO 0.20 Li ₂ O 0.10 trace	99.94	
A1. I	.853	.158	.026	.062	.121	.137	.048	.037			.012	.003	.003			
15	50.29	15.85	8.22	1.43	4.65	7.71	2.98	3.53	1.98	1.77	0.96	0.51	0.15	CO ₂ none Cl trace NiO trace BaO 0.15 SrO 0.09 Li ₂ O trace	100.27	
A1. I	.838	.155	.051	.020	.116	.137	.048	.037			.012	.004	.002			
16	57.67	18.07	1.09	4.23	2.69	6.24	3.14	4.02	0.17	0.22	1.04	0.11	0.80	ZrO ₂ 0.32 Cl 0.04	99.85	
A2. II	.961	.177	.007	.058	.067	.112	.051	.042			.013	.001	.011			
17	57.51	19.18	1.76	3.39	2.44	6.32	3.28	3.18	0.09	0.09	2.02	0.41	none	ZrO ₂ none Cl 0.07 FeS ₂ 0.23	99.97	
A2. II	.959	.188	.011	.047	.061	.113	.053	.034			.025	.003	—			
18	57.39	18.26	1.58	5.10	1.51	6.52	2.78	4.59	0.11	0.20	1.11	0.11	0.88	ZrO ₂ 0.03 Cl 0.05	100.22	
A2. II	.967	.179	.010	.071	.038	.116	.045	.049			.014	.001	.013			
19	56.90	18.50	0.17	4.61	5.10	6.17	2.99	4.14	0.51		0.19	0.79	trace	Cl trace	100.07	
A2. II	.948	.181	.001	.064	.127	.110	.048	.044			.002	.006	—			
20	56.64	17.00	3.11	5.06	2.79	6.20	3.16	3.40	0.70	0.31	0.81	0.44	0.20	CO ₂ none ZrO ₂ none SO ₃ none Cl none F none S 0.03 NiO none BaO 0.06 SrO trace	99.91	2.837
A1. I	.944	.167	.019	.070	.070	.111	.051	.036			.010	.003	.003			
21	53.95	18.56	3.86	4.23	2.35	6.58	3.36	3.88	0.68	0.30	0.76	0.60	0.17	CO ₂ 0.85 ZrO ₂ none Cl none F none S 0.06 NiO none BaO 0.13 SrO 0.07	100.39	2.783
A1. I	.899	.182	.024	.058	.059	.118	.054	.041			.010	.004	.002			
22	52.10	19.35	4.63	4.16	3.19	7.15	3.39	3.77	0.13	0.06	0.94	0.71	0.10		99.68	
A2. II	.868	.190	.029	.058	.080	.128	.055	.040			.012	.005	.001			
23	51.43	19.35	5.32	4.70	3.05	7.09	3.54	3.52	0.35	0.08	0.85	0.60	trace		99.88	
A2. II	.857	.190	.033	.065	.076	.127	.057	.037			.011	.004	—			
24	48.25	16.73	3.99	6.28	5.77	8.32	3.24	4.08	1.72		0.89	0.68	trace	SO ₃ 0.12 Cl 0.08 BaO 0.01	100.16	
A1. I	.804	.164	.025	.088	.144	.148	.052	.043			.011	.005	—			
25	54.80	16.69	5.18	2.73	3.61	6.23	3.74	3.57	0.37	0.55	1.14	0.78	0.10	CO ₂ none ZrO ₂ 0.07 F 0.02 S 0.01 Cr ₂ O ₃ trace V ₂ O ₅ 0.03 BaO 0.17 SrO 0.04	99.83	
A1. I	.913	.164	.033	.038	.090	.111	.060	.038			.014	.005	.001			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODIOPOTASSIC. SHOSHONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	II.5.3.3''.	or 21.68 di 10.80 ab 23.30 hy 4.30 an 21.96 ol 0.56 mt 2.09 il 1.67 hm 4.96 ap 1.68	Sepulcher Mountain, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 340, 1899.	Shoshonite.	In W. T., p. 267.
14	II''5.3.3''.	or 20.57 di 11.98 ab 23.15 hy 8.41 an 20.29 ol 1.18 mt 5.80 il 1.82 ap 1.01	Dike Mountain, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, U. S. G. S. B. 168, p. 98, 1900.	Augite andesite.	In W. T., p. 267.
15	II.5.3.3.⊙	Q 1.08 di 11.66 or 20.57 hy 6.20 ab 25.15 mt 2.78 an 19.46 il 1.52 hm 6.24 ap 1.34	Deer Creek, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, U. S. G. S. B. 168, p. 97, 1900.	Gabbro porphyry.	In W. T., p. 269.
16	II.''5.3.3.	Q 5.64 di 5.72 or 23.35 hy 10.35 ab 26.72 mt 1.62 an 23.35 il 1.98 ap 0.34	Monarch, Colorado.	R. M. Butters.	R. D. Crawford, Colo. G. S. B. 4, p. 133, 1913.	Quartz diorite.	
17	(I)II.(4)5.3.3(4).	Q 9.66 di 0.43 or 18.90 hy 7.35 ab 27.77 mt 2.55 an 28.08 il 3.80 ap 1.01	Jennings Gulch, Monarch District, Colorado.	R. M. Butters.	R. D. Crawford, Colo. G. S. B. 4, p. 162, 1913.	Andesite.	MnO?
18	''II.''5.3.3.	Q 7.02 di 5.80 or 27.24 hy 7.38 ab 23.58 mt 2.32 an 23.63 il 2.13 ap 0.34	Lost Mountain, Monarch District, Colorado.	R. M. Butters.	R. D. Crawford, Colo. G. S. B. 4, p. 133, 1913.	Quartz diorite.	MnO?
19	II.5.3.3.⊙	Q 1.80 hy 20.75 or 24.46 mt 0.23 ab 25.15 il 0.30 an 24.74 ap 2.02	Turkey Creek, Jefferson County, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. Mon. 27, p. 310, 1896.	Syenite.	In W. T., p. 269.
20	II.''5.3.3''.	Q 7.62 di 4.80 or 20.02 hy 10.45 ab 26.72 mt 4.41 an 22.24 il 1.52 ap 1.01	Caribou, Boulder County, Colorado.	G. Steiger.	E. S. Bastin, U. S. G. S. rec. lab.	Quartz monzonite.	
21	II.5.3.3.⊙	Q 3.18 di 4.29 or 22.80 hy 7.24 ab 23.30 mt 5.57 an 23.91 il 1.52 ap 1.34	Caribou, Boulder County, Colorado.	G. Steiger.	E. S. Bastin, U. S. G. S. rec. lab.	Monzonite.	
22	II.5.3.3''.	or 22.24 di 3.56 ab 28.82 hy 7.42 an 26.41 ol 0.90 mt 6.73 il 1.82 ap 1.68	Caribou, Boulder County, Colorado.	E. P. Jennings.	E. P. Jennings, Tr. Am. Inst. M. E., XLIV, p. 1047, 1913.	Gabbro.	Edge of stock.
23	II.5.3.3(4).	or 20.57 di 4.02 ab 23.87 hy 5.45 an 26.69 ol 2.15 mt 7.66 il 1.67 ap 1.34	Caribou, Boulder County, Colorado.	E. P. Jennings.	E. P. Jennings, Tr. Am. Inst. M. E., XLIV, p. 1047, 1913.	Gabbro.	Center of stock.
24	II''5(6).3.3.	or 23.91 di 13.90 ab 14.67 ol 10.53 an 19.18 mt 5.80 ne 6.82 il 1.67 ap 1.68	Valmont, Boulder County, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. Mon. 27, p. 301, 1896.	Dolerite.	Also in U.S.G.S. B. 150, p. 264, 1898. In W. T., p. 269.
25	II.5.(2)3.3(4).	Q 4.50 di 6.05 or 21.13 hy 6.20 ab 31.44 mt 5.80 an 18.35 il 2.13 hm 1.28 ap 1.68	Lost Trail Creek, San Cristobal quadrangle, Colorado.	C. Palmer.	W. Cross, U. S. G. S. rec. lab.	Trachydolerite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
26	54.06	19.07	4.69	4.40	1.15	6.78	3.20	2.98	0.57	1.19	1.38	0.62	0.15	CO ₂ none ZrO ₂ 0.03 S 0.02 BaO 0.07 SrO 0.01	100.37	
A1. I	.901	.187	.029	.061	.029	.121	.052	.032			.017	.004	.002			
27	52.59	17.91	3.81	5.18	4.11	7.24	2.94	3.83	1.24		0.84	0.14	trace	Cl 0.05	99.88	2.83
A2. II	.877	.175	.024	.072	.103	.129	.047	.040			.011	.001	—			
28	49.69	18.06	2.64	6.19	.573	8.24	2.99	3.90	0.91		0.85	0.81	0.13	Cl 0.13	100.27	
	.288	.177	.016	.086	.143	.147	.048	.041			.011	.006	.002			
29	55.90	15.52	1.22	5.22	4.70	5.79	2.89	4.45	1.40	0.60	0.90	0.46	0.08	CO ₂ 0.14 SrO 0.09	99.36	
B2. III	.932	.152	.008	.072	.118	.104	.047	.048			.011	.003	.001			
30	50.66	16.91	1.71	6.17	5.50	8.26	2.89	4.45	1.06	0.14	1.32	0.91	0.16	BaO 0.23 SrO 0.08	100.45	2.843
A2. II	.844	.166	.011	.086	.138	.147	.047	.048			.033	.006	.002			
31	56.78	16.86	3.56	2.93	3.41	6.57	3.19	3.48	1.21	0.15	1.15	0.42		CO ₂ 0.18	99.89	2.67
A2. II	.946	.165	.022	.040	.085	.118	.051	.037			.014	.003				
32	56.19	16.76	3.05	4.18	3.79	6.53	2.53	4.46	0.66	0.34	0.69	0.55	0.10	BaO 0.19 SrO trace Li ₂ O trace	100.02	
A2. II	.937	.164	.020	.058	.095	.117	.041	.048			.009	.004	.001			
33	57.26	17.79	3.39	3.45	2.02	6.58	3.06	4.15	0.55	0.53	0.71	0.21	0.29	CO ₂ 0.04 Cl trace F 0.04 FeS ₂ 0.13 BaO 0.07 Cu trace	100.27	
A1. I	.954	.174	.021	.048	.051	.118	.049	.045			.009	.002	.004			
34	56.32	17.30	3.88	4.32	2.61	4.78	2.91	4.37	1.49		0.72	0.47	0.13	FeS ₂ 0.13	99.35	2.740
B2. III	.939	.170	.024	.060	.065	.086	.047	.047			.009	.003	.002			
35	56.32	19.69	0.46	4.63	1.78	5.57	3.44	4.60	1.60	0.13	0.83	0.20	0.09	CO ₂ 0.54 ZrO ₂ 0.08 BaO 0.42	100.38	2.769
A1. I	.939	.193	.003	.064	.045	.100	.055	.049			.010	.001	.001			
36	47.6	17.6	4.8	5.8	5.0	8.6	2.3	4.3	2.2		1.6				99.8	
B3. IV	.792	.172	.030	.080	.125	.153	.037	.046			.020					
37	49.00	17.20	0.93	6.30	9.40	6.00	2.21	4.85	2.00		1.76	0.45			100.10	
A2. II	.817	.169	.006	.088	.235	.107	.085	.052			.022	.003				
38	59.41	17.92	1.71	2.40	2.99	4.65	2.63	5.60	1.30		0.01	0.87			99.49	
A2. II	.990	.175	.011	.033	.077	.083	.042	.060			—	.006				
39	47.50	17.57	7.24	5.08	3.31	7.09	3.60	3.28	1.70		3.02	0.48		CO ₂ 0.30	100.17	
A2. II	.792	.172	.045	.071	.083	.127	.058	.035			.038	.003				
40	55.19	16.42	5.20	4.28	2.31	8.23	2.82	3.79	2.26						100.50	2.748
A3. III	.920	.161	.032	.060	.058	.146	.045	.040								

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODIIPOTASSIC. SHOSHONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
26	"II.(4)5.3.3(4).	Q 8.40 di 1.14 or 17.79 hy 4.58 ab 27.23 mt 6.73 an 28.63 il 2.58 ap 1.34	Huerto Peak, San Cristobal quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. rec. lab.	Basalt.	
27	II.5.3.3.○	Q 0.06 di 8.53 or 22.24 hy 11.06 ab 24.63 mt 5.57 an 24.46 il 1.67 ap 0.34	Table Mountain, n. Denver, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. Mon. 27, p. 306, 1896.	Basalt.	In W. T., p. 269.
28	II.5.3.3.○	or 22.80 di 8.80 ab 19.39 ol 13.20 an 24.46 mt 3.71 ne 3.12 il 1.67 ap 2.02	Table Mountain, n. Denver, Colorado.	W. F. Hille- brand.	W. S. Cross, U. S. G. S. Mon. 27, p. 308, 1906.	Basalt.	In W. T., p. 269.
29	II.5.(2)3.3.	Q 2.34 di 8.37 or 26.69 hy 14.84 ab 24.10 mt 1.86 an 15.85 il 1.67 ap 1.01	Phoenix, British Columbia.	M. F. Connor.	O. E. LeRoy, Can. G. S. Mem. XXI, p. 49, 1912.	Augite porphyrite.	
30	II''5.''3.3.	or 26.69 di 12.28 ab 17.29 ol 9.98 an 19.74 mt 2.55 ne 3.98 il 5.02 ap 2.02	Salmon River, Rossland Mountains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 305, 1912.	Monzonite.	
31	II.(4)5.3.3''.	Q 8.70 di 6.73 or 20.57 hy 5.80 ab 26.72 mt 5.10 an 21.41 il 2.13 ap 1.01	Clover Meadow, Tuolumne County, California.	G. Steiger.	F. L. Ransome, U. S. G. S. B. 89 p. 58, 1898.	Augite latite.	Also in A. J. S., V, p. 363, 1898. In W. T., p. 269.
32	II.''5.3.3.	Q 5.94 di 6.48 or 26.69 hy 10.34 ab 21.48 mt 4.64 an 20.85 il 1.37 ap 1.34	Table Mountain, Tuolumne County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14 (II), p. 491, 1894.	Basalt.	In W. T., p. 269.
33	II.''5.3.3.	Q 7.68 di 6.99 or 25.02 hy 4.35 ab 25.68 mt 4.87 an 22.24 il 1.37 ap 0.67	Ely, Nevada.	R. C. Wells.	A. C. Spencer, U. S. G. S. rec. lab.	Monzonite porphyry.	
34	II.''5.3.3.	Q 7.20 hy 11.52 or 26.13 mt 5.57 ab 24.63 il 1.37 an 21.13 ap 1.01	Media Luna, n. Coyaima, Upper Magdalena, Colombia.	A. Lindner.	E. Lehmann, T. M. P. M., XXX, p. 249, 1911.	Quartz monzonite.	
35	(I)II.5.3.3.	Q 1.92 di 1.86 or 27.24 hy 10.44 ab 28.82 mt 0.70 an 24.74 il 1.52 ap 0.34	Olavarria, n. Buenos Aires, Argentina.	M. Dittrich.	H. Backlund, Minist. Agric. Arg. B. 2 B, p. 27, 1913.	Diorite.	
36	II''5.3.3.	or 25.58 di 15.20 ab 12.05 ol 6.95 an 24.74 mt 6.96 ne 3.98 il 3.04	Malvern, England.	J. H. Player.	C. Callaway, Q. J. G. S., XLIX, p. 419, 1893.	Diorite.	In W. T., p. 269.
37	II.5.3.(2)3.	or 28.91 di 3.34 ab 13.10 ol 21.42 an 22.80 mt 1.39 ne 2.84 il 3.34 ap 1.01	Vaugneray, n. Lyon, France.	Pisani.	A. Lacroix, pers. com.	"Vaugner- ite." ⁷⁾	
38	(I)II.(4)5.(2)3.''3.	Q 9.18 hy 10.69 or 33.36 mt 2.55 ab 22.01 ap 2.02 an 17.51 C 1.02	Cabezo Felipe, n. Cartagena, Spain.	A. Osann.	A. Osann, Z. D. G. G., XLIII, p. 719, 1891.	Andesite.	TiO ₂ low? In W. T., p. 269.
39	II.5.3.3(4).	or 19.46 di 8.21 ab 27.25 ol 3.15 an 21.96 mt 7.66 ne 1.70 il 5.78 hm 1.92 ap 1.01	Hukon, Christiania Fjord, Norway.	L. Schmelck.	W. C. Brögger, Q. J. G. S., L, p. 33, 1894.	Labradorite porphyrite.	In W. T., p. 269.
40	II.''5.3.3.	Q 6.12 di 15.96 or 22.24 hy 1.76 ab 23.58 mt 7.42 an 21.13	Gebweiler, Vosges Mountains.	V. Traumann.	A. Osann, Abh. G. Kte. Els. Lothr., III, p. 117, 1887.	Labrador- porphyrite.	In W. T., p. 269.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
41	51.98	18.84	4.98	5.40	2.77	6.13	3.04	3.60	2.58						99.32	
B3. IV	.866	.185	.031	.075	.069	.109	.049	.038								
42	50.08	18.87	3.47	3.49	2.14	6.70	4.10	4.58	4.17		1.39	0.39	0.29	CO ₂ Cl S 0.20 0.28 0.04	100.19	2.651
A2. II	.835	.185	.022	.049	.054	.120	.066	.049			.018	.003	.004			
43	50.08	21.68	3.88	4.00	2.85	7.78	4.21	3.96	0.55		1.24				100.23	2.607
A3. III	.835	.212	.024	.056	.071	.139	.068	.042			.016					
44	50.52	17.98	5.09	5.90	3.36	7.95	3.60	3.70	1.03		trace	1.31			100.41	
A3. III	.842	.176	.032	.082	.084	.142	.058	.039			—	.009				
45	49.75	16.72	5.70	4.99	3.89	9.69	3.08	3.02	2.18		0.18	0.72			99.92	2.857
A2. II	.829	.164	.036	.069	.097	.173	.050	.033			.003	.005				
46	57.32	17.35	3.23	4.04	2.63	5.87	3.53	4.06	0.55		1.08	0.17	0.08		99.91	
A2. II	.955	.170	.020	.056	.066	.105	.056	.044			.014	.001	.001			
47	53.59	15.09	1.57	7.47	4.66	7.26	2.86	3.48	2.70			1.20		S 0.28	100.34	
A3. III	.893	.148	.010	.104	.117	.130	.046	.037				.008				
48	58.00	16.68	2.28	3.79	3.89	5.09	2.61	4.67	1.71	0.15	1.43	0.23	0.13		100.66	2.87
A2. II	.967	.164	.014	.053	.097	.091	.042	.050			.018	.002	.002			
49	55.45	16.10	2.14	4.72	4.28	6.67	3.03	4.47	2.11	0.08	1.12	0.08			100.25	2.89
A2. II	.924	.158	.013	.065	.107	.120	.048	.048			.014	—				
50	51.29	15.68	2.75	6.40	6.37	7.06	1.94	3.74	2.49	0.11	1.77	0.62	0.16		100.38	2.96
A2. II	.855	.154	.017	.089	.159	.126	.031	.039			.022	.004	.002			
51	47.95	17.31	2.17	5.82	7.45	7.77	2.98	2.99	3.84	0.24	1.52	0.41	0.11		100.56	2.93
A2. II	.799	.170	.014	.081	.186	.139	.048	.032			.019	.003	.002			
52	55.25	15.65	3.80	2.67	5.94	6.42	2.98	3.83	1.94	0.16	0.91	0.49			100.01	2.84
A2. II	.921	.153	.024	.038	.149	.114	.048	.040			.011	.004				
53	53.30	17.25	2.98	5.24	3.72	7.41	2.98	2.80	2.70	0.05	1.37				100.00	2.92
A3. III	.888	.169	.019	.073	.093	.132	.048	.030			.017					
54	52.83	17.28	1.69	5.70	5.35	6.37	2.12	4.46	2.37	0.26	0.79			S 0.17	99.39	
B3. IV	.881	.169	.011	.079	.134	.114	.034	.048			.010					
55	51.92	16.19	1.08	9.08	4.42	5.81	2.43	3.40	3.14	0.30	1.97				99.74	2.91
A3. III	.865	.159	.007	.126	.111	.104	.039	.036			.025					
56	56.14	18.85	3.25	2.54	2.64	5.05	2.69	5.63	2.01		1.63		trace		100.43	
A3. III	.936	.185	.020	.035	.066	.090	.044	.060			.020		—			
57	54.56	16.49	1.02	5.65	8.57	7.95	2.07	3.35	0.15		1.10		trace		100.91	
B3. IV	.909	.162	.009	.078	.214	.142	.033	.036			.013		—			

ORDER 5. PERFELIC GERMANARE—Continued.

SUBRANG 3. SODIOTASSIC. SHOSHONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
41	II.5.3.3.⊙	Q 1.44 di 2.54 or 21.13 hy 11.45 ab 25.68 mt 7.19 an 27.24	Masmünster, Vosges Mountains.	A. Walther.	A. Osann, Abh. G. Kte. Els. Lothr., III, p. 125, 1887.	Labrador- porphyrite.	In W. T., p. 269.
42	II.5."3.3".	or 27.24 di 7.94 ab 25.15 ol 2.02 an 20.57 mt 5.10 ne 3.98 il 2.74 hl 0.47 ap 1.01	Mondhalde, Kaiserstuhl, Baden.	P. Jannasch.	F. Graeff, Ber. Oberh. G. Ver., XXIII, 1889.	Tephrite.	Mondhaldeite in K. Grüss, Mt. Bad. G. L.-A., IV (2), p. 97, 1901. In W. T., p. 271.
43	II.5(6).3.3(4).	or 23.35 di 8.21 ab 18.86 ol 3.73 an 28.36 mt 5.57 ne 9.09 il 2.43	Schackau, Rhöngebirge.	H. Gachet.	H. Gachet, In. Diss. Strassb., p. 15, 1912.	Trachy- phonolite.	
44	II.5.3.3(4).	or 21.68 di 7.51 ab 23.30 ol 8.29 an 21.96 mt 7.42 ne 1.14 ap 3.02	Rongstock, Bohemia.	R. Pfohl.	J. E. Hibsich, T. M. P. M., XV, p. 487, 1895.	Dolerite (essexite).	In W. T., p. 271.
45	II".5.3.3(4).	or 18.35 di 16.84 ab 24.89 ol 4.57 an 22.52 mt 8.35 ne 0.71 ap 1.68	Eichberg, n. Habendorf, Bohemia.	R. Pfohl.	J. E. Hibsich, T. M. P. M., XIV, p. 112, 1894.	Leucite tephrite.	In W. T., p. 271.
46	II.5."3.3.	Q 5.58 di 6.98 or 24.46 hy 6.28 ab 29.34 mt 4.64 an 19.74 il 2.13 ap 0.34	Val delle Scandole, Monte Mulatto, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak. Wiss., 1904, p. 49.	Hypersthene monzonite.	
47	II".5.3.3.	Q 0.96 di 8.75 or 20.57 hy 19.76 ab 24.10 mt 2.32 an 18.07 ap 2.69	Eggenspitze, Netenthal, Tyrol.	C. v. John.	W. Hammer, Jb. G. R.-A., Wien, LIII, p. 83, 1904.	Kersantite.	
48	II.(4).5.3.3.	Q 8.34 di 2.65 or 27.80 hy 11.47 ab 22.01 mt 3.25 an 20.02 il 2.74 ap 0.67	Tschirva Road, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Mica diorite.	
49	II.5.(2).3.3.	Q 1.50 di 13.90 or 26.69 hy 9.00 ab 25.15 mt 3.02 an 16.12 il 2.13	Mortersatsch Glacier, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Lamprophyre.	
50	II(III).5.3.3.	Q 0.84 di 9.42 or 21.68 hy 18.21 ab 16.24 mt 3.94 an 23.35 il 3.34 ap 1.34	Boval Road, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Lamprophyre.	
51	II".5.3.3(4).	or 17.79 di 8.68 ab 20.44 ol 15.13 an 25.02 mt 3.25 ne 2.56 il 2.89 ap 1.01	Boval Road, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Gabbro- diorite.	
52	II.5."3.3.	Q 4.50 di 7.31 or 22.24 hy 11.63 ab 25.15 mt 5.57 an 18.07 il 1.67 ap 1.34	Piz Posta Bialla, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Kersantite.	
53	II.5.3.3(4).	Q 4.02 di 9.14 or 16.68 hy 9.70 ab 25.15 mt 4.41 an 25.30 il 2.58	Haslital, Bernese Alps, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Hornblende diorite.	
54	II.5.3."3.	or 26.69 di 6.09 ab 17.82 hy 17.24 an 24.19 ol 0.62 mt 2.55 il 1.52	Hospice, St. Gotthard, Switzerland.	K. M. Jene.	P. Waindziock, In. Diss. Zur., p. 33, 1906.	Kersantite.	Metamorphosed.
55	II".5.3.3.	Q 1.32 di 4.61 or 20.02 hy 21.22 ab 20.44 mt 1.62 an 23.35 il 3.80	Bellezza, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 203, 1909.	Vogesite.	
56	(I)II.5.3."3.	Q 4.50 di 1.94 or 33.36 hy 5.70 ab 23.06 mt 3.48 an 22.52 il 3.04 hm 0.80	Orciatice, Pisa Province, Tuscany.	A. Martelli.	A. Martelli, B. Soc. G. Ital., XXVIII, p. 436, 1909.	Trachyte.	
57	II(III).5.3".3.	or 20.02 di 10.87 ab 17.29 hy 21.27 an 25.85 ol 1.25 mt 1.39 il 2.00	Radicofani, Tuscany.	H. S. Washing- ton.	H. S. Washington, A. J. S., IX, p. 52, 1900.	Andesite.	Gray. In W. T., p. 271.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
58	54.14	16.42	1.69	5.26	8.44	8.05	2.20	3.34	0.56		1.23		trace		101.33	
B3. IV	.902	.161	.011	.073	.211	.144	.035	.036			.015		—			
59	56.76	16.79	2.07	6.95	1.63	6.01	2.43	4.67	2.44			0.47			100.22	2.470
A73. III	.946	.165	.013	.097	.041	.107	.039	.050				.003				
60	56.81	20.05	4.23	2.65	1.53	5.30	3.53	5.59	0.52						100.21	2.64
A3. III	.947	.196	.026	.037	.038	.095	.056	.060								
61	55.69	17.87	4.07	3.26	3.41	6.87	2.89	4.41	0.17		1.02	0.19			99.85	2.717
A2. II	.928	.175	.025	.045	.085	.123	.047	.047			.013	.001				
62	51.75	19.59	0.93	6.23	4.24	8.02	2.38	4.90	1.38		1.19	0.41			101.02	
A2. II	.863	.192	.006	.086	.106	.143	.039	.052			.015	.003			(100.82)	
63	50.10	18.93	2.65	4.65	6.60	9.75	2.03	4.21	0.75		0.97	0.57		Cl trace	101.21	
B2. III	.835	.185	.017	.065	.165	.174	.032	.045			.012	.004				
64	56.10	18.13	3.55	4.23	2.78	6.55	3.17	4.72	n. d.		0.80	0.37			100.40	
A3. III	.935	.178	.022	.058	.070	.117	.052	.050			.010	.003				
65	55.34	17.14	6.28	3.26	3.09	7.07	3.45	3.17	0.92				0.52		100.24	
A3. III	.922	.168	.039	.045	.077	.127	.056	.034					.007			
66	60.25	19.70	0.54	3.61	2.81	6.60	2.33	4.18	0.83		0.35				101.20	
B3. IV	1.004	.193	.003	.050	.070	.118	.037	.045			.004					
67	51.54	18.80	2.67	3.88	3.33	8.00	4.13	4.19	1.57	0.24	1.18	0.29			99.82	
A2. II	.859	.184	.017	.054	.083	.143	.066	.045			.015	.002				
68	50.67	15.31	4.58	6.67	5.25	7.48	2.84	2.72	0.13	0.32	2.83	0.88			99.68	
A2. II	.845	.150	.029	.093	.131	.134	.046	.029			.035	.006				
69	51.00	18.50	3.10	5.99	2.56	6.32	3.86	4.69	1.25		2.11	0.62		SO ₂ 0.16	100.16	2.745
A2. II	.850	.181	.019	.083	.064	.113	.062	.050			.026	.004				
70	47.51	16.87	4.41	7.99	4.27	8.07	3.26	3.16	0.99		2.65	0.55	trace	ZrO ₂ 0.18 SO ₂ 0.25	100.16	2.864
A2. II	.792	.166	.028	.111	.107	.145	.053	.034			.033	.004	—			
71	56.66	18.02	4.33	3.67	4.17	4.50	3.62	4.45	1.34		trace	trace			100.76	
A3. III	.944	.176	.027	.051	.104	.080	.058	.048			—	—				
72	51.38	14.80	1.76	7.67	6.48	8.15	2.35	4.45	1.15		1.54	0.63	0.08		100.44	
A2. II	.856	.145	.011	.107	.162	.140	.038	.048			.019	.004	.001			
73	54.10	19.01	4.32	2.45	3.02	8.90	3.08	2.98	2.04	0.52					100.42	
A3. III	.902	.186	.027	.034	.076	.159	.050	.032								

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 2. SODIOPOTASSIC. SHOSHONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
58	II(III).5.3.3.	or 20.02 di 11.98 ab 18.34 hy 18.19 an 25.02 ol 2.43 mt 2.55 il 2.28	Radicofani, Tuscany.	H. S. Washing- ton.	H. S. Washington, A. J. S., IX, p. 52, 1900.	Andesite.	Black. In W. T., p. 271.
59	II.'5.3.3.	Q 6.72 di 4.99 or 27.80 hy 12.90 ab 20.44 mt 3.02 an 21.13 ap 1.01	Sassara, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. Wiss., p. 96, 1888.	Olivine trachyte.	Also in N. J. B. B., VI, p. 7, 1889 In W. T., p. 271.
60	(I)II.5.'3.3.	Q 1.62 di 3.34 or 33.36 hy 3.66 ab 29.34 mt 6.03 an 22.24	Piano Cigliano, Cimino Volcano, n. Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Oligoclasite (vulsinite).	Al ₂ O ₃ high?
61	II.5.3.3.⊙	Q 4.26 di 8.52 or 26.13 hy 5.43 ab 24.63 mt 5.80 an 22.52 il 1.98 ap 0.36	Monte Santa Croce, Rocca Monfina, Italy.	H. S. Washing- ton.	H. S. Washington, J. G., V, p. 252, 1897.	Biotite vulsinite.	Complete in R. C. R., p. 88, 1906. In W. T., p. 271.
62	II.5.3.'3.	or 28.91 di 7.23 ab 17.82 ol 11.49 an 28.08 mt 1.39 ne 1.42 il 2.28 ap 1.01	Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus., IX, p. 149, 1907.	Sommaite (leucite monzon- ite).	Cf. C. R., CXLI, p. 1190, 1905.
63	II.5.3.''3.	or 25.02 di 11.74 ab 13.62 ol 11.22 an 30.02 mt 3.94 ne 1.70 il 1.82 ap 1.34	Monte Somma, Italy.	Pisani.	A. Lacroix, Mat. Min. Mad., p. 189, 1902.	Sommaite (leucite monzon- ite).	Inclusion in leu- cite tephrite.
64	II.5.'3.3.	Q 2.70 di 7.09 or 27.80 hy 6.94 ab 27.25 mt 3.10 an 21.13 il 1.52 ap 1.01	Eruption 1888-89, Vulcano, Aeolian Islands.	Pisani.	A. Lacroix, C. R., CXLVII, p. 1453, 1908.	Microsanidi- nite.	Inclusion in trachyte.
65	II.'5.3.3(4).	Q 5.22 di 10.80 or 18.90 hy 4.29 ab 29.34 mt 9.05 an 21.68	Atatsch, S. Ural Moun- tains, Russia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XXIII, p. 132, 1904.	Labradorite porphyry.	
66	(I)II.4(5).3.''3.	Q 10.20 di 1.61 or 25.02 hy 11.88 ab 19.39 mt 0.70 an 30.86 il 0.61	Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., p. 77, 1902.	Monzonite.	Metamorphic?
67	II.5(6).3.3''.	or 25.02 di 11.80 ab 20.96 ol 3.99 an 23.07 mt 3.94 ne 7.38 il 2.28 ap 0.67	Nosy Komba, Madagascar.	Not stated.	A. Lacroix, pers. com.	Gabbro dis- solved in nephelinite syenite.	Cf. No. 18, I. 6.2.4 and -No. 123, II. 5.4.4.
68	II(III).5.3.3(4).	Q 2.76 di 8.64 or 16.12 hy 12.80 ab 24.10 mt 6.73 an 20.85 il 5.32 ap 2.02	N. of Amboutra, Madagascar.	Not stated.	A. Lacroix, pers. com.	Hypersthene gabbro.	
69	II.5.'3.3.	or 27.80 di 4.80 ab 24.10 ol 6.63 an 21.96 mt 4.41 ne 4.54 il 3.95 ap 1.34	Korissimbi, Lake Kivu Dis- trict, German East Africa.	Eyme.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 11, 1912.	Trachy- dolerite.	
70	II.'5.3.3(4).	or 18.90 di 11.99 ab 21.74 ol 8.34 an 21.96 mt 6.50 ne 3.26 il 5.02 ap 1.34	West Kibo, Kilimanjaro, German East Africa.	Eyme.	L. Finckh, Z. D. G. G., LXV, p. 495, 1913.	Trachytoid trachy- dolerite.	"ZrO ₂ by color with H ₂ O ₂ ."
71	II.5.(2)3.3.	Q 1.80 di 2.22 or 26.69 hy 12.50 ab 30.39 mt 6.26 an 19.46	Peishan Massif, Manchuria.	C. Pfeil.	C. Pfeil, in K. Futterer, Durch Asien, II (1), p. 351, 1905.	Porphyrite.	
72	II(III).5.'3.'3.	or 26.69 di 16.75 ab 18.86 ol 13.35 an 16.40 mt 2.55 ne 0.57 il 2.89 ap 1.34	Torigoe, Ninohe-gun, Mutsu Province, Japan.	K. Yokoyama.	S. Kozu, Sci. Rep. Toh. Un., II, p. 4, 1914.	Kentallenite.	
73	II.5.3.3(4).	Q 3.84 di 12.04 or 17.79 hy 2.88 ab 26.20 mt 6.26 an 28.91	Antamok River, Benguet, Luzon, Philippine Islands.	P. J. Fox.	A. J. Eveland, Philip. J. Sci. (A), II, p. 227, 1907.	Andesite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
74	53.92	18.68	4.27	2.65	2.93	8.85	2.92	2.66	2.23	0.44					99.55	
A3. III	.899	.183	.027	.037	.073	.158	.047	.029								
75	55.42	17.39	1.56	6.82	3.28	7.57	2.41	2.67	0.17	none	1.07	0.58	0.71	ZrO ₂ none Cl 0.11 F 0.03 S 0.03 Cr ₂ O ₃ none BaO 0.13 SrO 0.03	99.98	
A1. I	.924	.170	.010	.094	.082	.136	.039	.029			.013	.004	.010			
76	48.32	17.81	4.65	4.62	3.37	9.15	3.14	4.79	0.82	0.17	0.88	0.82	0.41	ZrO ₂ none Cl 0.10 F 0.04 S 0.23 Cr ₂ O ₃ none BaO 0.11 SrO 0.21	99.64	
A1. I	.805	.174	.029	.064	.084	.164	.051	.051			.011	.006	.006			
77	49.32	18.11	2.51	4.86	8.05	8.90	1.90	3.30	1.80	0.28	0.60	0.27	0.47		100.37	2.89
A2. II	.822	.177	.016	.068	.201	.159	.039	.035			.008	.002	.007			
78	53.90	15.32	3.60	5.13	2.41	7.30	3.73	3.44	0.97	0.74	2.86	0.55	0.36	CO ₂ 0.03 ZrO ₂ none Cl 0.02 FeS none Cr ₂ O ₃ none V ₂ O ₅ 0.02 NiO 0.02 BaO 0.06 SrO trace CuO 0.01	100.47	2.779
A1. I	.898	.150	.023	.071	.060	.130	.060	.036			.036	.004	.005			
79	52.42	18.05	4.30	3.60	3.60	6.14	3.75	4.14	1.07	1.47	1.16	0.34	0.28	CO ₂ 0.04 Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ 0.05 NiO 0.03 BaO 0.11 SrO trace CuO 0.05	100.60	2.722
A1. I	.874	.177	.027	.050	.090	.109	.060	.044			.015	.002	.004			
80	52.12	18.47	3.40	4.77	5.11	8.71	3.07	3.29	0.46		trace	0.25	trace	SO ₂ trace	99.65	
A3. III	.889	.191	.021	.067	.128	.155	.050	.035			—	.002	—			
81	52.65	17.79	3.01	5.46	5.34	6.50	3.04	4.06	0.95		0.89	0.18			99.87	
A2. II	.878	.174	.019	.076	.134	.116	.049	.044			.011	.001				
82	50.71	17.08	1.38	8.71	3.63	5.75	3.82	3.63	1.75	0.16	2.71	0.57	0.09		99.99	
A2. II	.845	.167	.009	.121	.091	.103	.061	.038			.034	.004	.001			

RANG 3. ALKALICALCIC. ANDASE.

1	48.85	19.38	4.29	4.94	2.00	7.98	5.44	1.91	0.68		2.47	1.23	0.19		99.36	
B2. III	.814	.190	.027	.068	.050	.143	.088	.020			.031	.009	.003			
2	51.50	18.81	4.30	6.41	2.90	6.78	4.84	1.76	2.44		0.40				100.14	
A3. III	.858	.184	.027	.089	.073	.121	.078	.019			.005					
3	50.75	17.31	2.08	8.13	3.48	6.77	4.14	2.87	0.56		3.05	0.10	trace	CO ₂ none	99.14	
B2. III	.846	.170	.013	.113	.087	.121	.067	.031			.038	.001	—			
4	50.59	17.74	3.54	7.45	3.92	6.85	4.25	2.79	0.55		2.60	0.27	trace		100.55	
A2. II	.843	.174	.022	.104	.098	.122	.068	.030			.033	.002	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODIOPOTASSIC. SHOSHONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
74	II."5.3".3(4).	Q 6.00 di 11.21 or 16.12 hy 2.83 ab 24.63 mt 6.26 an 29.75	Antamok River, Benguet, Luzon, Philippine Islands.	P. J. Fox.	A. J. Eveland, Philip. J. Sci. (A), II, p. 251, 1907.	Andesite.	
75	II.(4)5.3(4)."3.	Q 8.94 di 4.86 or 16.12 hy 14.02 ab 20.44 mt 2.32 an 28.36 il 1.98 ap 1.34	Bromo Volcano, Java.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Shoshonite.	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.
76	II.5(6)."3.3.	or 28.36 di 16.16 ab 11.53 ol 3.29 an 20.02 mt 6.73 ne 8.24 il 1.67 ap 2.02	Near Ragou, Mount Moeriah, Java.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Leucite tephrite.	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.
77	II."5.3".3.	or 19.46 di 10.90 ab 16.77 ol 15.52 an 28.63 mt 3.71 ne 1.99 il 1.22 ap 0.67	Red Hill, Ipswich, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1912.	Basalt.	H. C. Richards. pers. com.
78	II."5.(2)3.3(4).	Q 4.44 di 14.09 or 20.02 hy 1.50 ab 31.44 mt 5.34 an 15.01 il 5.47 ap 1.34	Nowra, Milton, New South Wales.	H. P. White.	G. W. Card, Rec. G. S. N. S. W., VIII (2), p. 85, 1905.	Orthoclase basalt.	
79	II.5."3.3".	or 24.46 di 6.39 ab 31.44 hy 1.96 an 20.29 mt 3.97 il 2.28 ap 0.67	Bumbo, Kiama, New South Wales.	H. P. White.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII (1), p. 12, 1905.	Orthoclase basalt.	
80	II.5.3.3".	or 19.46 di 11.68 ao 25.15 hy 0.43 an 26.69 ol 9.25 mt 4.87 ap 0.67	Tilba Tilba Lake, New South Wales.	J. C. H. Min- gaye.	W. Anderson, Rec. G. S. N. S. W., II, p. 153, 1892.	Hornblende andesite.	In W. T., p. 271.
81	II.5.3.3.○	or 24.46 di 7.17 ab 25.68 hy 4.32 an 22.52 ol 8.46 mt 4.41 il 1.67 ap 0.34	Petermann Island, Weddell Quad- rant, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Diabase.	
82	II.5."3.3(4).	or 21.13 di 5.07 ab 31.44 ol 12.57 an 18.90 mt 2.09 ne 0.28 il 5.17 ap 1.34	North Foothills, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 130, 1907.	Kersantite.	

SUBRANG 4. DOSODIC. ANDOSE. (C. I. P. W., 1903.)

1	II.5".3.4".	or 11.12 di 6.92 ab 36.41 ol 2.43 an 22.80 mt 6.26 ne 4.97 il 4.71 ap 3.02	Mount Johnson, Quebec.	N. N. Evans.	F. D. Adams, J. G., XI, p. 265, 1903.	Essexite.	
2	II.5.3.4.○	or 10.56 di 7.82 ab 39.03 ol 8.06 an 24.19 mt 6.26 ne 0.99 il 0.76	Nighthawk Lake, Abitibi region, Ontario.	A. G. Burrows.	G. F. Kay, Rep. Bur. Min. Ont., XIII, p. 117, 1904.	Dolerite.	
3	II.5.3".4.	or 17.24 di 10.58 ab 31.18 ol 8.55 an 20.02 mt 3.02 ne 2.13 il 5.78 ap 0.34	Tripyramid Mountain, Waterville, New Hampshire.	R. W. Langley.	L. V. Pirsson, A. J. S., XXXI, p. 424, 1911.	Essexite.	
4	II.5."3.4.	or 16.68 di 9.06 ab 31.44 ol 8.64 an 20.85 mt 5.10 ne 2.56 il 5.02 ap 0.67	Tripyramid Mountain, Waterville, New Hampshire.	C. J. Monahan.	L. V. Pirsson, A. J. S., XXXI, p. 424, 1911.	Camptonite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5	48.67	16.88	4.98	6.37	4.62	8.63	3.85	1.26	0.32	0.02	2.12	1.85			99.57	
A2. II	.811	.166	.031	.089	.115	.154	.062	.018			.026	.013				
6	52.12	16.35	3.68	6.02	4.14	7.25	3.65	2.34	0.88	0.25	2.10	0.89	0.17	CO ₂ 0.07 ZrO ₂ 0.02 Cl 0.09 F 0.03 FeS ₂ 0.24 NiO trace BaO 0.04	100.30	
A1. I	.869	.160	.023	.084	.104	.129	.059	.025			.026	.006	.002			
7	55.51	16.51	1.68	4.57	6.73	6.73	3.19	2.46	1.53		0.91	0.17	0.11	BaO 0.02	100.12	
A2. II	.925	.162	.011	.064	.168	.120	.052	.027			.012	.001	.002			
8	51.82	17.06	1.97	8.60	4.87	8.59	3.44	1.77	0.20	0.11	2.15				100.58	
A3. III	.864	.167	.012	.120	.122	.153	.056	.019			.027					
9	49.84	17.45	1.64	9.43	4.77	8.34	3.90	1.35	0.54	0.26	1.56	0.10	0.15	CO ₂ none S 0.12 BaO trace SrO trace	99.45	3.090
A2. II	.831	.171	.010	.131	.119	.149	.063	.015			.020	.001	.002			
10	45.27	18.30	3.30	10.13	4.08	7.32	3.64	1.07	2.08		2.77	1.27	0.86	S 0.08 NiO trace	100.17	2.958
A2. II	.755	.179	.021	.140	.102	.130	.059	.011			.035	.009	.012			
11	54.38	20.53	2.78	5.50	1.99	5.39	5.20	3.40	0.50		0.09	0.15	0.01	Cl 0.03 S 0.03 BaO 0.16	100.14	2.70
A1. I	.906	.201	.018	.076	.050	.096	.084	.036			.001	.001	—		(100.03)	
12	54.10	17.45	4.52	6.47	2.33	6.17	3.81	3.06	0.48	0.09	0.19	0.88	0.35	ZrO ₂ none Cl none F 0.05 S 0.14 Cr ₂ O ₃ none BaO 0.10	100.19	
A1. I	.902	.171	.028	.090	.058	.111	.061	.033			.002	.006	.005			
13	55.34	16.37	0.77	7.54	5.05	7.51	4.06	2.03	0.58				0.40	CO ₂ trace	99.65	
A3. III	.922	.160	.005	.105	.126	.134	.065	.022					.006			
14	51.49	20.72	1.80	7.28	3.82	6.71	3.70	2.14	0.31	0.10	2.26	0.15	0.13	S 0.11 BaO trace	100.72	
A2. II	.858	.203	.011	.101	.096	.120	.060	.022			.028	.001	.002			
15	50.74	20.30	1.23	7.27	3.78	7.28	3.82	2.21	0.31	0.10	2.31	0.15	0.13	S 0.12	99.75	
A2. II	.846	.199	.008	.101	.095	.130	.061	.023			.029	.001	.002			
16	47.42	17.34	4.91	10.22	5.21	8.09	3.48	1.89	1.13		0.36	0.06	0.06	Cl 0.21 BaO 0.04	100.42	
A2. II	.790	.170	.031	.142	.130	.145	.056	.020			.005	—	.001			
17	46.73	16.66	3.56	8.45	8.12	8.03	3.73	1.64	2.39		0.03	0.39	trace	Cl 0.18 F 0.26 Cr ₂ O ₃ 0.06 BaO 0.04	100.27	
A1. I	.779	.163	.023	.118	.203	.143	.060	.017			—	.003	—		(100.20)	
18	57.74	18.90	1.42	3.87	3.52	6.42	3.74	1.72	1.11	0.06	1.24	0.28	0.02	S 0.20	100.19	
A2. II	.962	.185	.009	.054	.088	.114	.060	.018			.016	.002	—			
19	53.20	15.83	3.39	6.79	5.44	6.95	3.73	1.34	1.44	0.63	1.35		0.15		100.24	
A2. II	.887	.155	.021	.094	.136	.124	.060	.014			.017		.002			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	II''5.3.4.	or 10.01 di 5.56 ab 32.49 hy 10.27 an 23.91 ol 2.01 mt 7.19 il 3.95 ap 4.37	Tripyramid Mountain, Waterville, New Hampshire.	C. J. Monahan.	L. V. Pirsson, A. J. S., XXXI, p. 414, 1911.	Norite.	
6	II.5.3.4.⊙	Q 2.34 di 7.42 or 13.90 hy 11.70 ab 30.92 mt 5.34 an 21.13 il 3.95 ap 2.02	Mount Ascutney, Vermont.	W. F. Hille- brand.	R. A. Daly, U. S. G. S. B. 203, p. 41, 1903.	Diorite.	In W. T., p. 273.
7	II''5.3.4''.	Q 2.40 di 7.56 or 15.01 hy 18.85 ab 27.25 mt 2.55 an 23.07 il 1.82 ap 0.34	South Leverett, Massachusetts.	L. G. Eakins.	B. K. Emerson, U. S. G. S. Mon. 29, p. 336, 1898.	Tonalite.	In W. T., p. 273.
8	II(III).5.3.4.	or 10.56 di 13.98 ab 29.34 hy 8.36 an 25.58 ol 5.59 mt 2.78 il 4.10	Peach's neck, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VII, p. 60, 1899.	Diorite.	In W. T., p. 273.
9	II''5.3.4.	or 8.34 di 12.25 ab 31.44 ol 14.69 an 25.85 mt 2.32 ne 0.85 il 3.04 ap 0.34	Montrose, Lynnfield, Essex County, Massachusetts.	M. F. Connor.	C. H. Clapp, pers. com.	Gabbro diorite.	
10	II''5.3''4''.	or 6.12 hy 8.32 ab 30.92 ol 10.77 an 27.80 mt 4.87 C 0.92 il 5.32 ap 3.02	Iron Mine Hill, Cumberland, Rhode Island.	C. H. Warren.	C. H. Warren, A. J. S., XXVI, p. 470, 1908.	Gabbro.	
11	''II.5.(2)3.''4.	or 20.02 di 2.78 ab 37.73 ol 8.38 an 22.52 mt 4.18 ne 3.41 il 0.15 ap 0.34	Altamont, Franklin County, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R. LIV (1), (1900), p. R 68, 1902.	Anorthosite.	
12	II.5.3.(3)4.	Q 2.82 di 3.25 or 18.35 hy 12.76 ab 31.96 mt 6.50 an 21.41 il 0.30 ap 2.02	Raquette Falls, Long Lake, Adirondack Mountains, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R. LX (2), p. 513, 1907.	Syenite.	
13	II''5.3.4.	or 12.23 di 14.04 ab 34.06 hy 10.88 an 20.29 ol 6.47 mt 1.16	Montrose Point, Cortlandt, New York.	M. D. Munn.	J. D. Dana, A. J. S., XXII, p. 104, 1881.	Norite.	Cf. G. H. Wil- liams, A. J. S., XXXIII, p. 193, 1887. In W. T., p. 273.
14	II.5.3''4.	or 12.23 hy 11.74 ab 31.44 ol 4.62 an 32.53 mt 2.55 C 0.41 il 4.26 ap 0.34	Near Peekskill, Cortlandt, New York.	G. S. Rogers.	G. S. Rogers, Ann. N. Y. Ac. Sci., XXI, p. 61, 1911.	Norite.	Also in A. J. S., XXXI, p. 127, 1911.
15	II.5.3''4.	or 12.79 di 2.75 ab 31.96 hy 3.05 an 31.97 ol 10.14 mt 1.86 il 4.41 ap 0.34	Near Peekskill, Cortlandt, New York.	G. S. Rogers.	G. S. Rogers, Ann. N. Y. Ac. Sci., XXI, p. 62, 1911.	Norite.	
16	II(III).5.3.4.	or 11.12 di 11.76 ab 23.06 ol 15.31 an 26.13 mt 7.19 ne 3.41 il 0.61	Hopkinton, St. Lawrence County, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R. LIII (1899), p. R 58, 1901.	Hyperite- gabbro.	TiO ₂ corrected, H. P. C., pers. com.
17	II(III).5.3.4.	or 9.45 di 6.12 ab 25.68 ol 21.93 an 23.91 mt 5.34 ne 3.12 ap 1.01	Belmont Township, Franklin County, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. A. R. LIV (1900), p. R 78, 1902.	Olivine diabase.	
18	''II.(4)5.3''4.	Q 9.78 hy 12.63 or 10.01 mt 2.09 ab 31.44 il 2.43 an 23.75 ap 0.67	Tye River, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 95, 1913.	Gabbro.	
19	IV.5.3.4.	Q 2.64 di 9.67 or 7.78 hy 16.57 ab 31.44 mt 4.87 an 22.52 il 2.58	Crooked Creek, Pine County, Minnesota.	C. Tronson.	F. F. Grout, J. G., XVIII, p. 647, 1910.	Diabase.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
20	52.48	15.47	5.14	9.25	2.55	7.27	3.26	1.75	1.24		1.26	0.29	0.51	BaO none SrO none	100.47	2.83
A2. II	.875	.151	.032	.129	.064	.129	.052	.019			.016	.002	.007			
21	56.88	15.61	2.95	2.34	6.35	5.23	3.59	2.39	3.03	0.67	0.49	0.13		CO ₂ none	99.66	
A2. II	.948	.153	.019	.032	.159	.093	.058	.026			.006	.001				
22	56.80	18.30	1.64	5.58	3.63	5.31	4.35	3.28	0.53		0.46	trace	trace	BaO 0.05 Li ₂ O trace	99.93	2.83
A2. II	.947	.179	.010	.078	.091	.095	.070	.035			.006	—				
23	56.41	17.62	1.24	3.55	3.97	8.66	3.35	2.61	0.76	0.14	0.68	0.49	0.08	Cl 0.07 BaO 0.09 SrO 0.08	99.70	
A1. I	.940	.174	.007	.050	.099	.154	.054	.027			.009	.003	.001			
24	55.13	20.27	1.52	4.29	1.80	7.05	4.31	2.84	0.95	0.14	0.74	0.40	0.13	CO ₂ 0.28 BaO 0.06 SrO 0.11 Li ₂ O trace	100.00	
A1. I	.919	.198	.009	.060	.045	.126	.099	.030			.009	.003	.002			
25	54.84	16.41	3.63	4.54	4.71	6.64	3.27	2.83	0.93	0.34	0.99	0.35	none	CO ₂ none ZrO ₂ none S none NiO none BaO 0.12 SrO 0.05	99.65	
A1. I	.914	.160	.023	.063	.118	.119	.053	.030			.013	.003	—			
26	54.09	16.00	2.92	5.54	5.19	7.37	3.38	2.67	0.77	0.20	0.99	0.35	0.15	CO ₂ none ZrO ₂ none S none NiO none BaO 0.10 SrO 0.06	99.78	
A1. I	.902	.157	.018	.077	.130	.132	.055	.029			.013	.003	.002			
27	54.56	17.58	4.30	4.98	2.86	6.00	4.43	2.70	0.38	0.02	1.34	0.60	0.06	BaO 0.27 SrO 0.08 Li ₂ O trace	100.16	
A1. I	.909	.172	.027	.069	.072	.107	.071	.029			.017	.004	.001			
28	50.73	19.99	3.20	4.66	3.48	8.55	4.03	1.89	0.66	0.11	1.59	0.81	0.05	BaO 0.27 SrO 0.11 Li ₂ O trace	100.13	
A1. I	.846	.196	.020	.065	.087	.153	.065	.020			.020	.006	—			
29	53.48	19.35	2.37	4.90	3.67	7.55	4.07	1.41	0.80	0.16	1.07	0.62	0.06	BaO 0.19 SrO 0.11 CO ₂ 0.08	99.89	
A1. I	.891	.190	.015	.068	.092	.135	.066	.015			.013	.004	.001			
30	58.05	18.00	2.49	4.56	3.55	6.17	3.64	2.18	0.86		1.05	0.17	none	SO ₃ 0.07 Cl trace Li ₂ O none	100.79	
A2. II	.968	.176	.016	.064	.089	.111	.059	.023			.013	.001	—			
31	57.38	16.86	2.49	5.17	5.51	7.32	3.33	1.45	0.42		trace	trace	trace	SO ₃ 0.21 Cl 0.17 Li ₂ O 0.39	100.70	
A2. II	.956	.165	.016	.072	.138	.131	.054	.015			—	—	—			
32	57.17	17.25	2.48	4.31	4.83	6.61	3.44	2.03	1.20		1.03	0.05	none	SO ₃ trace Cl trace	100.40	
A2. II	.953	.160	.015	.060	.121	.118	.055	.022			.013	—	—			
33	55.92	17.70	3.16	4.48	4.34	5.90	4.08	2.24	1.42		0.94	0.18	trace	SO ₃ trace Cl none Li ₂ O 0.09	100.45	
A2. II	.932	.174	.020	.062	.109	.105	.066	.025			.012	.001	—			
34	57.64	18.43	3.63	2.84	3.32	5.49	4.03	3.33	0.51		0.77	0.34	0.10	Cl trace	100.43	
A2. II	.961	.181	.023	.040	.083	.098	.065	.035			.010	.002	.001			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
20	II''/5.3.4.	Q 5.82 di 9.63 or 10.56 hy 12.85 ab 27.25 mt 7.42 an 22.52 il 2.43 ap 0.67	Duluth, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 293, 1900.	Orthoclase gabbro.	In W. T., p. 273.
21	II.(4)5.3./4.	Q 7.14 di 4.57 or 15.57 hy 14.69 ab 29.34 mt 4.41 an 19.18 il 0.91 ap 0.34	Bald Butte, Marysville District, Montana.	G. Steiger.	J. S. Barrell, U. S. G. S. P. P. 57, p. 45, 1907.	Hornblende porphyrite.	
22	II.5./3./4.	or 19.46 di 4.80 ab 36.68 hy 13.80 an 20.57 ol 0.83 mt 2.32 il 0.91	Robinson, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 90, 1896.	Diorite.	In W. T., p. 273.
23	II./5.3.4''.	Q 4.98 di 11.44 or 15.01 hy 9.00 ab 28.30 mt 1.62 an 25.85 il 1.37 ap 1.01	Red Mountain, n. Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 739, 1899.	Diorite.	Also in U. S. G. S. P. P. 74, p. 33, 1912. In W. T., p. 273.
24	''II.5.3.4.	Q 1.26 di 3.93 or 16.68 hy 8.35 ab 36.16 mt 2.09 an 27.52 il 1.37 ap 1.01	Near Neihart, Little Belt Mountains, Montana.	W. F. Hille- brand.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 490, 1900.	Diorite.	In W. T., p. 273.
25	II./5.3.(3)4.	Q 5.10 di 7.10 or 16.68 hy 11.97 ab 27.77 mt 5.34 an 21.41 il 1.93 ap 1.01	Haystack Mountain, Park County, Montana.	G. Steiger.	W. H. Emmons, J. G., XVI, p. 214, 1908.	Quartz- orthoclase gabbro.	
26	II''/5.3.(3)4.	Q 0.96 di 11.06 or 16.12 hy 15.14 ab 28.82 mt 4.18 an 20.29 il 1.98 ap 1.01	Haystack Mountain, Park County, Montana.	G. Steiger.	W. H. Emmons, J. G., XVI, p. 216, 1908.	Orthoclase gabbro.	
27	II.5./3.4.	Q 2.70 di 4.94 or 16.12 hy 8.24 ab 37.20 mt 6.26 an 20.02 il 2.58 ap 1.34	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 143, 1897.	Diorite porphyrite.	In W. T., p. 273.
28	II.5.3''/4.	or 11.12 di 4.91 ab 34.06 hy 5.35 an 30.86 ol 3.09 mt 4.64 il 3.04 ap 2.02	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 144, 1897.	Diorite.	In W. T., p. 273.
29	II.5.3''/4''.	Q 2.46 di 2.94 or 8.34 hy 13.18 ab 34.58 mt 3.48 an 30.30 il 1.98 ap 1.34	Sweet Grass Creek, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 143, 1897.	Quartz diorite.	In W. T., p. 273.
30	II.(4)5.3.4.	Q 9.06 di 3.16 or 12.79 hy 11.86 ab 30.92 mt 3.71 an 26.13 il 1.98 ap 0.34	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. A. R. 12, p. 627, 1891.	Diorite.	In W. T., p. 273.
31	II.(4)5.3''/4.	Q 7.26 di 7.88 or 8.34 hy 17.37 ab 28.30 mt 3.71 an 26.69	Electric Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. A. R. 12, p. 627, 1891.	Porphyrite.	In W. T., p. 273.
32	II.(4)5.3.4.	Q 7.68 di 5.78 or 12.23 hy 13.56 ab 28.82 mt 3.48 an 25.58 il 1.98	Sepulcher Mountain, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. A. R. 12, p. 648, 1891.	Pyroxene andesite.	In W. T., p. 275.
33	II.5.3.4.⊙	Q 3.62 di 4.23 or 13.90 hy 12.83 ab 34.58 mt 4.64 an 23.07 il 1.32 ap 0.34	Sepulcher Mountain, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. A. R. 12, p. 648, 1891.	Hornblende andesite.	In W. T., p. 275.
34	''II./5.3.(3)4.	Q 6.00 di 2.19 or 19.46 hy 8.12 ab 34.06 mt 5.34 an 22.52 il 1.52 ap 0.67	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 261, 1899.	Andesite porphyry.	In W. T., p. 273.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
35	57.32	17.29	3.89	3.03	3.56	5.81	3.89	3.04	0.30	0.33	0.62	0.50	0.06	NiO 0.10	99.74	
A2. II	.955	.170	.024	.042	.089	.104	.063	.032			.008	.004	.001			
36	57.26	19.40	2.49	3.29	2.57	5.68	4.21	2.95	0.86		0.76	0.51	0.16		100.14	
A2. II	.954	.190	.016	.046	.064	.101	.068	.039			.010	.003	.002			
37	56.21	18.24	3.26	3.69	3.38	5.91	4.15	3.02	0.78		0.88	0.64	0.17		100.33	
A2. II	.937	.179	.020	.051	.085	.106	.067	.032			.011	.005	.002			
38	55.93	18.32	2.39	4.91	3.97	6.17	4.29	2.62	0.22		0.81	0.56	0.14		100.33	
A2. II	.932	.180	.015	.068	.099	.110	.069	.028			.010	.004	.002			
39	53.71	18.00	3.99	4.05	5.19	6.88	3.50	3.10	0.55		0.74	0.38	0.24		100.33	
A2. II	.895	.176	.025	.056	.130	.123	.056	.033			.009	.003	.003			
40	53.89	18.81	4.92	2.81	3.29	5.42	3.65	2.98	2.99		0.49	0.52	0.17		99.94	
A2. II	.898	.184	.031	.039	.082	.097	.059	.032			.006	.004	.002			
41	52.09	17.84	4.27	4.56	5.33	8.03	3.39	1.98	1.77		0.39	0.27	0.14		100.06	
A2. II	.868	.175	.027	.064	.133	.143	.055	.021			.005	.002	.002			
42	56.47	15.33	2.54	4.53	5.08	6.93	3.81	1.66	1.65		0.99	0.54	0.18		99.71	
A2. II	.941	.150	.015	.062	.127	.123	.061	.018			.012	.004	.003			
43	53.75	20.75	4.50	3.53	3.76	7.18	4.16	1.37	1.55		none	0.15	trace	CO ₂ none SO ₃ trace Cl none Li ₂ O trace	100.70	
A2. II	.896	.203	.028	.049	.094	.128	.067	.015			—	.001	—			
44	53.57	17.78	3.19	4.93	4.36	6.22	4.04	3.04	0.80	0.27	0.89	0.44	0.07	CO ₂ none Cr ₂ O ₃ none NiO trace BaO 0.21 SrO 0.13	99.94	
A1. I	.893	.174	.020	.068	.109	.110	.064	.032			.011	.003	.001			
45	52.37	16.57	6.34	2.35	5.27	8.54	2.99	2.45	1.04	1.18	0.73	0.31	0.07	NiO 0.12	100.33	
A2. II	.873	.162	.039	.033	.132	.152	.048	.026			.009	.002	.001			
46	52.18	18.19	3.31	4.36	4.69	6.51	4.58	1.88	2.00	0.75	0.99	0.29	0.14	CO ₂ none Cl trace S none NiO trace BaO 0.11 SrO 0.06 Li ₂ O trace	100.04	
A1. I	.870	.178	.021	.061	.117	.116	.074	.020			.012	.002	.002			
47	51.70	17.90	7.24	1.00	2.77	6.94	4.17	1.62	1.15		3.17	0.41	trace	SO ₃ 0.32 Li ₂ O 0.03 Iron 1.81	100.23	
A2. II	.862	.175	.045	.014	.069	.124	.068	.017			.039	.003	—			
48	57.42	18.48	3.74	2.10	1.71	6.84	4.52	3.71	0.28	0.08	0.86	0.36	0.09	CO ₂ none SO ₃ none Cl 0.03 BaO 0.15 SrO 0.08 Li ₂ O trace	100.45	2.767
A1. I	.957	.181	.023	.030	.043	.122	.072	.039			.011	.003	.001			
49	56.62	16.74	4.94	3.27	4.08	7.39	3.50	1.97	0.92	1.15		trace	0.15		100.73	2.768
A3. III	.944	.164	.031	.046	.102	.132	.056	.021				—	.002			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
35	II."5.3."4.	Q 7.14 di 3.52 or 17.79 hy 8.69 ab 33.01 mt 5.57 an 20.95 il 1.22 ap 1.34	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 261, 1899.	Monzonite.	In W. T., p. 275.
36	"II.5.3.(3)4.	Q 1.92 di 1.79 or 21.68 hy 8.44 ab 35.63 mt 3.71 an 23.07 il 1.52 ap 1.01	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 261, 1899.	Diorite.	Facies of gabbro. In W. T., p. 275.
37	II.5.3."4.	Q 3.96 di 1.79 or 17.79 hy 10.54 ab 35.11 mt 4.64 an 22.52 il 1.67 ap 1.68	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 260, 1899.	Orthoclase gabbro- diorite.	In W. T., p. 275.
38	II.5.3.4.⊙	Q 1.56 di 3.18 or 15.57 hy 14.31 ab 36.16 mt 3.48 an 23.07 il 1.52 ap 1.34	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 260, 1899.	Orthoclase gabbro- diorite.	In W. T., p. 275.
39	II.5.3.(3)4.	Q 0.36 di 5.75 or 18.35 hy 13.57 ab 29.34 mt 5.80 an 24.19 il 1.37 ap 1.01	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 260, 1899.	Orthoclase basalt.	In W. T., p. 275.
40	II."5.3."4.	Q 6.00 hy 8.46 or 17.79 mt 7.19 ab 30.92 il 0.91 an 23.35 ap 1.34 C 0.92	Indian Peak, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 260, 1899.	Basalt-glass breccia.	In W. T., p. 275.
41	II.5.3"4.	Q 0.60 di 8.31 or 11.68 hy 13.77 ab 28.82 mt 6.26 an 27.52 il 0.76 ap 0.67	Timber Creek, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 260, 1899.	Basalt.	In W. T., p. 275.
42	II.(4)5.3.4.	Q 6.66 di 6.48 or 10.01 hy 14.59 ab 31.96 mt 3.48 an 22.52 il 1.82 ap 1.34	Dunraven Peak, Yellowstone National Park.	F. A. Gooch.	J. P. Iddings, U. S. G. S. B. 148, p. 135, 1897.	Pyroxene andesite.	In W. T., p. 275.
43	II.5.3(4).4".	Q 2.58 di 0.89 or 8.34 hy 11.74 ab 35.11 mt 6.50 an 33.64 ap 0.34	Mount Washburn, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. B. 148, p. 136, 1897.	Basalt.	No TiO ₂ ? In W. T., p. 275.
44	II.5.3."4.	or 17.79 di 4.94 ab 33.54 hy 12.49 an 21.68 ol 0.31 mt 4.64 il 1.67 ap 1.01	Beams Hill, Sunlight Valley, Yellowstone National Park.	H. N. Stokes.	T. A. Jaggar, U. S. G. S. B. 168, p. 95, 1900.	Gabbro.	In W. T., p. 275.
45	II.5.3.(3)4.	Q 3.84 di 12.31 or 14.46 hy 7.60 ab 25.15 mt 5.80 an 24.46 il 1.37 hm 2.24 ap 0.67	Stinkingwater Canyon, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, U. S. G. S. B. 148, p. 135, 1897.	Basalt.	In W. T., p. 275.
46	II.5.3.4.⊙	or 11.12 di 5.56 ab 38.78 hy 5.75 an 23.35 ol 5.21 mt 4.87 il 1.82 ap 0.67	Shoshone Canyon, Yellowstone National Park.	W. F. Hille- brand.	T. A. Jaggar, U. S. G. S. B. 168, p. 96, 1900.	Diabase.	In W. T., p. 275.
47	II.5.3"4.	Q 4.14 hy 6.90 or 9.45 il 2.13 ab 35.63 hm 7.24 an 27.80 tn 2.74 ap 1.01	Yellowstone Canyon, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. B. 148, p. 135, 1897.	Basalt.	Iron bearing. In W. T., p. 275.
48	"II.5.(2)(3)(3)4.	Q 3.96 di 9.07 or 21.68 hy 0.10 ab 37.73 mt 4.64 an 19.46 il 1.67 hm 0.48 ap 1.01	Babcock Peak, La Plata Moun- tains, Colorado.	H. N. Stokes.	W. Cross, U. S. G. S. Fol. 60, p. 6, 1899.	Monzonite.	In W. T., p. 277.
49	II.(4)5.3.4.	Q 8.64 di 9.91 or 11.68 hy 7.75 ab 29.34 mt 7.19 an 24.19	Buckskin Gulch, Alma District, Colorado.	W. F. Hille- brand.	H. B. Patton, Col. G. S. B. 3, p. 81, 1912.	Hornblende porphyrite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
50	55.65	17.04	2.81	5.17	3.42	6.82	3.27	2.29	1.49	0.46	0.90	0.37	0.20	SO ₃ none NiO none BaO 0.08 SrO 0.05 Li ₂ O trace	100.02	2.783
A1. I	.928	.167	.017	.072	.086	.121	.053	.024			.011	.003	.003			
51	47.32	16.71	6.92	5.94	5.69	8.51	2.70	2.02	1.04	0.24	1.50	0.96	0.08	CO ₂ none SO ₃ 0.19 Cl trace BaO 0.07 SrO 0.06 Li ₂ O trace	99.95	2.949
A1. I	.789	.164	.043	.082	.142	.151	.043	.021			.019	.007	.001			
52	53.60	17.89	4.20	5.45	3.77	7.53	2.91	1.98	0.64	0.55	0.74	0.30	0.18	CO ₂ 0.25 ZrO ₃ 0.03 F 0.02 S 0.05 Cr ₂ O ₃ trace V ₂ O ₅ 0.03 NiO none BaO 0.08 SrO 0.07	100.27	
A1. I	.893	.175	.026	.076	.094	.134	.047	.021			.009	.002	.003			
53	52.97	18.31	1.86	6.73	3.04	6.51	3.74	3.35	0.31	0.44	1.04	0.81	0.09	ZrO ₃ 0.05 BaO 0.18 SrO 0.14	99.57	
A1. I	.883	.179	.012	.093	.076	.116	.060	.035			.013	.006	.001			
54	48.76	15.89	6.04	4.56	5.98	8.15	3.43	2.93	1.48	0.40	1.65	0.60	0.13	ZrO ₃ none BaO 0.17 SrO 0.06 Li ₂ O none	100.23	
A1. I	.813	.155	.037	.063	.150	.145	.055	.031			.021	.004	.002			
55	55.46	18.15	3.93	3.42	3.19	7.37	3.44	2.14	0.38	0.24	1.20	0.38	0.21	CO ₂ none ZrO ₃ none S 0.04 BaO 0.07	99.62	
A1. I	.924	.178	.024	.047	.080	.132	.055	.022			.015	.003	.003			
56	55.04	20.45	2.09	2.71	1.63	5.82	4.92	4.29	0.69	0.10	1.17	0.37	0.26	CO ₂ none ZrO ₃ none S 0.04 BaO 0.19	99.77	
A1. I	.917	.200	.013	.038	.041	.104	.079	.046			.015	.003	.004			
57	54.86	19.33	3.35	2.59	3.05	7.69	4.38	2.33	0.80	0.16	1.32	0.41	0.22	CO ₂ none ZrO ₃ none S 0.06 BaO 0.17	100.72	
A1. I	.914	.190	.021	.036	.076	.138	.071	.024			.016	.003	.003			
58	52.38	18.79	2.88	4.90	4.91	7.70	3.99	1.76	0.53		1.22	0.56	0.18	BaO 0.11	99.91	
A2. II	.873	.174	.018	.068	.123	.137	.064	.019			.015	.004	.003			
59	52.37	17.01	1.44	5.89	6.86	7.59	3.51	1.59	1.29		1.60		0.32	CO ₂ 0.37 Cl trace BaO 0.06	99.90	
A2. II	.873	.167	.009	.082	.172	.135	.056	.017			.020		.005			
60	52.27	17.68	2.51	5.00	6.05	8.39	4.19	1.58	0.82		1.49		0.23	CO ₂ trace Cl trace BaO 0.06	100.27	
A2. II	.871	.173	.016	.069	.151	.150	.068	.017			.019		.003			
61	51.57	17.72	6.24	1.78	4.91	8.82	3.59	1.99	0.64		1.43		0.45	CO ₂ 0.58 BaO 0.16	99.88	
A2. II	.860	.174	.039	.025	.123	.157	.058	.021			.018		.006			
62	51.68	15.05	5.22	5.64	5.63	8.30	3.75	1.39	0.62	0.72	1.54	0.45	0.12	CO ₂ none	100.11	
A2. II	.861	.148	.033	.078	.141	.148	.061	.015			.019	.003	.002			
63	48.21	17.96	5.18	4.47	4.11	9.72	3.68	2.99	1.41	0.21	0.84	0.58	0.31	CO ₂ none ZrO ₃ none SO ₃ none BaO 0.07 SrO trace	99.74	
A1. I	.804	.176	.033	.063	.103	.173	.060	.032			.010	.004	.004			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
50	II.(4)5.3."4.	Q 7.92 di 4.76 or 13.34 hy 12.48 ab 27.77 mt 3.94 an 25.02 il 1.67 ap 1.01	Black Face, Telluride, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 163, 1900.	Camptonitic lampro- pyhre.	In W. T., p. 277.
51	II(III).5.3(4)."4.	Q 0.84 di 6.18 or 11.68 hy 14.04 ab 22.53 mt 9.98 an 27.80 il 2.89 ap 2.35	Near Mount Sneffels, Telluride, Colorado.	H. N. Stokes.	W. Cross, U. S. G. S. Fol. 57, p. 7, 1899.	Gabbro porphyry.	In W. T., p. 277
52	II.(4)5.3(4).4.	Q 6.78 di 4.51 or 11.68 hy 13.02 ab 24.63 mt 6.03 an 29.75 il 1.37 ap 0.67	Lost Trail Creek, San Cristobal quadrangle, Colorado.	C. Palmer.	W. Cross, U. S. G. S. rec. lab.	Diorite.	
53	II.5.3.(3)4.	or 19.46 di 2.78 ab 31.44 hy 12.56 an 23.35 ol 2.03 mt 2.78 il 1.98 ap 2.02	Saddle Mountain, Pikes Peak, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 148, p. 163, 1897.	Basalt.	In W. T., p. 277.
54	II".5.3."4.	or 17.24 di 13.71 ab 26.96 ol 6.71 an 19.18 mt 8.58 ne 0.99 il 3.19 ap 1.34	Saddle Mountain, Pikes Peak, Colorado.	W. F. Hille- brand.	W. Cross, J. G., V, p. 689, 1897.	Basalt.	In W. T., p. 277.
55	II.(4)5.3"4.	Q 8.88 di 4.60 or 12.23 hy 7.29 ab 28.82 mt 5.57 an 28.08 il 2.28 ap 1.01	Ortiz Mountains, n. Albuquerque. New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 234, 1908.	Diorite.	
56	(I)II.5.(2)3.(3)4.	or 25.58 di 4.26 ab 36.15 ol 2.81 an 20.85 mt 3.02 ne 2.84 il 2.28 ap 1.01	Ortiz Mountains, n. Albuquerque, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 233, 1908.	Diorite.	
57	II.5.3.4.⊙	Q 2.58 di 7.13 or 13.34 hy 4.44 ab 37.20 mt 4.87 an 26.41 il 2.43 a 1.01	Ortiz Mountains, n. Albuquerque, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 234, 1908.	Diorite.	
58	II.5.3.4.⊙	or 10.56 di 5.13 ab 33.54 hy 12.46 an 28.08 ol 1.73 mt 4.18 il 2.28 ap 1.34	Rio Grande Canyon, New Mexico.	L. G. Eakins.	J. P. Iddings, A. J. S., XXXVI, p. 220, 1888.	Basalt.	Also in U.S.G.S. B. 66, p. 30, 1890. In W. T., p. 277.
59	II".5.3.4.	or 9.45 di 9.18 ab 29.34 hy 15.25 an 26.13 ol 3.74 mt 2.09 il 3.04	Rio Grande Canyon, New Mexico.	L. G. Eakins.	J. P. Iddings, A. J. S., XXXVI, p. 220, 1888.	Quartz basalt.	Also in U.S.G.S. B. 66, p. 30, 1890. In W. T., p. 277.
60	II.5.3.4.⊙	or 9.45 di 13.81 ab 35.37 ol 9.59 an 24.46 mt 3.71 ne 0.14 il 2.89	Rio Grande Canyon, New Mexico.	L. G. Eakins.	J. P. Iddings, A. J. S., XXXVI, p. 220, 1888.	Quartz basalt.	Also in U.S.G.S. B. 66, p. 30, 1890. In W. T., p. 277.
61	II.5.3.4.⊙	Q 0.66 di 13.39 or 11.68 hy 6.10 ab 30.39 mt 3.02 an 26.41 il 2.74 hm 4.16	Rio Grande Canyon, New Mexico.	L. G. Eakins.	J. P. Iddings, A. J. S., XXXVI, p. 220, 1888.	Quartz basalt.	Also in U.S.G.S. B. 66, p. 30, 1890. In W. T., p. 277.
62	II(III).5.3.4.	Q 1.56 di 14.71 or 8.34 hy 10.84 ab 31.96 mt 7.66 an 20.02 il 2.89 ap 1.01	Barilla Mesa, Colfax County, New Mexico.	G. Steiger.	J. B. Mertie, U. S. G. S. rec. lab.	Basalt.	
63	II".5(6).3"4.	or 17.79 di 16.90 ab 19.39 ol 3.86 an 23.35 mt 7.66 ne 6.53 il 1.52 ap 1.34	Mount McKensie, Cerrillos Hills, New Mexico.	G. Steiger.	D. W. Johnston, Sch. Min. Q., XXV, p. 82, 1904.	Gabbro porphyry.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
64	61.60	17.34	2.22	2.73	2.46	4.92	5.10	2.16	0.51	0.12	0.73	0.24		SO ₃ Cl	none trace	100.13	2.63
A2. II	.027	.170	.014	.038	.062	.088	.082	.024			.009	.002					
65	57.64	17.07	3.07	5.15	2.80	5.55	4.20	2.14	0.05	0.09	1.57	0.37	0.08	CO ₂ SO ₃ Cl BaO SrO	none none trace 0.05 none	99.83 (99.85)	2.74
A1. I	.961	.167	.019	.072	.070	.099	.068	.023			.020	.003	.001				
66	56.51	16.28	2.93	5.13	4.12	6.10	3.94	2.18	0.40	0.10	1.50	0.30	0.08	CO ₂ SO ₃ Cl	none none trace	99.57	2.77
A2. II	.942	.160	.018	.071	.103	.109	.064	.023			.019	.002	.001				
67	53.97	16.00	4.56	3.63	6.36	7.47	4.38	1.23	1.31	0.03	1.46	0.10		CO ₂ SO ₃ Cl	none none trace	100.50	
A2. II	.900	.157	.029	.050	.159	.134	.071	.013			.018	.001					
68	51.53	18.21	4.59	5.46	4.99	8.05	3.45	1.67	0.31	0.20	1.50	0.36	0.10	CO ₂ SO ₃ Cl	none none trace	100.42	2.82
A2. II	.859	.179	.029	.076	.125	.144	.056	.018			.019	.003	.001				
69	59.44	17.40	3.30	2.77	1.81	6.51	4.22	3.12	0.56	0.06	0.66	0.28	0.17	CO ₂ F S BaO SrO	none trace 0.02 0.07 0.05	100.44	
A1. I	.991	.171	.021	.039	.045	.116	.068	.033			.008	.002	.002				
70	56.63	16.81	3.62	3.44	4.23	7.53	3.08	2.24	0.51	0.80	0.67	0.16	0.23	CO ₂ FeS ₂ V ₂ O ₅ BaO SrO	none 0.06 0.04 0.09 trace	100.14	
A1. I	.944	.165	.023	.048	.106	.134	.050	.024			.008	.001	.003				
71	56.07	19.06	5.39	0.92	2.12	7.70	4.52	1.24	0.99		1.24	0.16	0.23				
A2. II	.935	.187	.034	.011	.053	.138	.073	.013			.016	.001	.003				
72	51.54	20.31	4.65	3.56	3.16	9.55	4.29	2.47	0.34		0.32	0.57	0.32				
B2. III	.859	.199	.029	.049	.079	.171	.069	.026			.004	.004	.005				
73	56.03	18.31	3.47	4.42	3.64	7.43	3.60	1.18	0.31	0.12	1.24	0.13	0.11	CO ₂ S BaO SrO Li ₂ O	none trace trace trace trace	99.99	
A2. II	.934	.180	.022	.061	.091	.133	.058	.013			.016	.001	.002				
74	49.64	19.78	1.89	4.76	3.33	6.77	4.83	1.95	2.65	0.02	3.53	0.67	0.17	CO ₂	none	99.99	
A2. II	.827	.194	.012	.066	.083	.121	.077	.021			.044	.005	.002				
75	56.90	18.17	1.23	5.88	4.36	6.51	3.23	1.57	0.77	0.12	0.84	0.10	0.21	CO ₂ SrO	0.08 0.18	100.15	2.793
A2. II	.948	.178	.008	.082	.109	.116	.052	.017			.011	.001	.003				
76	54.06	18.75	4.64	3.10	2.75	7.35	4.60	3.00	0.41	0.10	0.80	0.55	trace	CO ₂	0.11	100.22	2.819
A2. II	.901	.182	.029	.043	.069	.131	.074	.032			.010	.004	—				
77	50.89	17.00	0.97	7.60	5.41	9.82	3.35	1.31	1.14	0.06	0.80	0.19	0.14	CO ₂ S	0.28 0.43	99.39	
B2. III	.848	.167	.006	.106	.135	.175	.054	.014			.010	.001	.002				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
64	(I)II.(4)5.(2)3.4.	Q 10.20 di 3.56 or 13.34 hy 6.48 ab 42.97 mt 3.25 an 17.79 il 1.37 ap 0.67	Mormon Mountain, San Francisco Mountains, Arizona.	H. H. Robinson.	H. H. Robinson, U. S. G. S. P. P. 76, p. 136, 1913.	Pyroxene latite.	
65	II.(4)5.3.4.	Q 8.76 di 2.94 or 12.79 hy 10.06 ab 35.63 mt 4.41 an 21.13 il 3.04 ap 1.01	San Francisco Peak, San Francisco Mountains, Arizona.	H. H. Robinson.	H. H. Robinson, U. S. G. S. P. P. 76, p. 142, 1913.	Augite andesite.	
66	II."5.3.4.	Q 6.42 di 6.52 or 12.79 hy 11.56 ab 33.54 mt 4.18 an 20.29 il 2.89 ap 0.67	Kendrick Peak, San Francisco Mountains, Arizona.	H. H. Robinson.	H. H. Robinson, U. S. G. S. P. P. 76, p. 144, 1913.	Augite andesite.	
67	II'"5.3.4'.	Q 1.90 di 12.56 or 7.23 hy 10.46 ab 37.20 mt 6.73 an 20.29 il 2.74 ap 0.34	Bill Williams Mountain, San Francisco Mountains, Arizona.	H. H. Robinson.	H. H. Robinson, U. S. G. S. P. P. 76, p. 147, 1913.	Andesite- basalt.	
68	II.5.3'4.	Q 1.32 di 6.42 or 10.01 hy 13.27 ab 29.34 mt 6.73 an 29.19 il 2.89 ap 1.01	Bill Williams Mountain, San Francisco Moun- tains, Arizona.	H. H. Robinson.	H. H. Robinson, U. S. G. S. P. P. 76, p. 145, 1913.	Andesite- basalt.	
69	II.(4)5.'"3.4.	Q 8.94 di 8.68 or 18.35 hy 1.93 ab 35.63 mt 4.87 an 19.46 il 1.22 ap 0.67	Jumbo Mine, Prince of Wales Island, Alaska.	G. Steiger.	C. W. Wright, U. S. G. S. P. P. 87, p. 34, 1915.	Granodiorite.	
70	II.(4)5.3.4.	Q 9.12 di 8.83 or 13.34 hy 9.05 ab 26.20 mt 5.34 an 25.30 il 1.22 ap 0.34	Delarof Harbor, Unga Island, Alaska.	W. F. Hille- brand.	G. F. Becker, ^ U. S. G. S. A. R. 18, (III), p. 55, 1898.	Augite- bronzite andesite.	In W. T., p. 277.
71	"II.(4)5.3.4(5).	Q 7.80 di 6.91 or 7.23 hy 2.10 ab 38.25 il 2.13 an 28.08 hm 5.39 tn 0.39 ap 0.34	Bogoslof Island, Alaska.	T. M. Chatard.	G. P. Merrill, Pr. U. S. Nat. Mus., VIII, p. 33, 1885.	Hornblende andesite.	Also G. S. Becker, U. S. G. S. A. R. 18 (III), p. 58, 1898. In W. T., p. 277.
72	II.5.3.4.⊙	or 14.46 di 12.01 ab 29.60 ol 3.54 an 28.91 mt 6.73 ne 3.55 il 0.01 ap 1.34	Bogoslof Island, Alaska.	T. M. Chatard.	G. P. Merrill, Pr. U. S. Nat. Mus., VIII, p. 33, 1885.	Hornblende andesite.	Also G. F. Becker, U. S. G. S. A. R. 18 (III), p. 58, 1898. In W. T., p. 277.
73	II.(4)5.3(4).A'.	Q 9.18 di 4.70 or 7.23 hy 10.14 ab 30.39 mt 5.10 an 30.30 il 2.43 ap 0.34	Kalinai Pass, Aleutian Penin- sula, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 233, 1900.	Augite aleutite.	In W. T., p. 277.
74	II.5.3.4.⊙	or 11.68 di 1.76 ab 38.77 ol 6.44 an 26.69 mt 2.78 ne 0.85 il 6.69 ap 1.68	Boston Mine, Juneau, Alaska.	J. G. Fair- child.	A. Knopf, U. S. G. S. B. 502, p. 28, 1912.	Albite diorite.	
75	II.(4)5.3(4).4.	Q 8.22 di 0.92 or 9.45 hy 19.15 ab 27.25 mt 1.86 an 30.30 il 1.67 ap 0.34	Slesse Mountain, Skagit Range, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38, (1), p. 533, 1912.	Diorite.	
76	II.5.'"3.4.	or 17.79 di 9.33 ab 38.77 hy 2.76 an 21.13 ol 0.28 mt 6.73 il 1.52 ap 1.34	Similkameen Laccolith, Okanagan Range, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 457, 1912.	Monzonite.	Contact. Cf. No. 30. I.4.3.4.
77	II(III).5.3(4).4.	or 7.78 di 16.73 ab 28.30 hy 4.28 an 27.52 ol 9.62 mt 1.39 il 1.52 ap 0.34	War Eagle mine, Trail Creek Dis- trict, British Columbia.	M. F. Connor.	R. W. Brock, Can. G. S. rec. lab.	Perp yrite.	Pers. com.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
78	50.60	18.61	1.51	7.45	6.05	8.30	3.80	0.80	2.89	0.16	0.34	0.07	0.11	Cl S	trace 0.02	100.71	
A2. II	.843	.182	.009	.104	.151	.148	.061	.009			.004	—	.002				
79	49.41	18.08	5.93	4.08	4.61	10.10	3.48	1.01	1.59	0.04	0.95		0.09			99.37	
B2. III	.824	.177	.037	.057	.115	.180	.056	.011			.012		.001				
80	48.68	18.05	3.41	6.44	2.82	10.00	3.18	1.60	2.40		0.80	2.01	0.20			99.59	2.91
A2. II	.811	.177	.021	.089	.071	.179	.051	.017			.010	.014	.003				
81	54.50	14.43	2.17	8.80	4.24	8.01	3.05	1.29	1.09	0.29	1.69	0.21	0.10	SO ₂ NiO BaO SrO	0.11 none 0.06 0.09	100.13	
A1. I	.908	.141	.014	.122	.106	.143	.049	.014			.021	.001	.001				
82	56.85	18.31	2.88	3.15	3.92	7.20	3.89	1.23	0.95	0.16	1.08	0.22	trace	CO ₂ S Cr ₂ O ₃ BaO SrO	none none none 0.04 trace	99.88	
A1. I	.948	.179	.018	.044	.098	.129	.063	.013			.014	.002	—				
83	52.99	16.71	3.80	3.55	6.95	8.49	3.56	1.29	0.59	0.18	1.18	0.42	trace	CO ₂ Cl S Cr ₂ O ₃ NiO BaO SrO Li ₂ O	none trace none none 0.02 0.07 0.12 none	99.92	
A1. I	.883	.164	.024	.050	.174	.151	.057	.014			.015	.003	—				
84	57.59	16.49	1.22	4.89	7.72	7.40	3.62	0.99	0.86							100.78	
A3. III	.960	.161	.007	.068	.193	.132	.058	.011									
85	57.37	15.66	2.06	4.46	8.84	4.94	3.05	1.54	0.61	0.12	0.60	0.02	0.27	NiO	0.41	99.92	2.830
A2. II	.956	.153	.013	.062	.221	.088	.049	.016			.008	—	.004				
86	57.25	16.45	1.67	4.72	6.74	7.65	3.00	1.57	0.40		0.60	0.20	0.10	BaO SrO Li ₂ O	none trace none	100.35	
A2. II	.954	.161	.010	.065	.169	.136	.048	.017			.008	.001	.001				
87	56.70	15.75	1.29	5.32	7.16	7.67	3.36	1.56	0.30		0.65	0.20	0.19	Cr ₂ O ₃ BaO SrO Li ₂ O	trace 0.03 trace trace	100.18	
A2. II	.945	.154	.008	.074	.179	.137	.054	.017			.008	.001	.003				
88	56.53	17.50	1.35	5.03	5.94	8.07	3.51	1.55	0.27		0.54	0.15	0.12	BaO Li ₂ O	trace trace	100.56	
A2. II	.942	.171	.009	.070	.149	.144	.056	.017			.007	.001	.002				
89	56.18	16.59	1.51	5.51	7.26	7.64	3.58	1.47	0.42							100.16	
A3. III	.936	.162	.009	.076	.182	.136	.058	.016									
90	55.93	17.34	1.50	5.20	7.29	8.04	3.32	1.35	0.26							100.23	
A3. III	.932	.170	.009	.072	.182	.143	.053	.015									
91	57.11	17.78	3.54	2.74	3.41	7.21	3.81	1.86	0.98		0.95	0.26	0.33	BaO SrO	0.03 trace	100.01	
A2. II	.952	.174	.022	.038	.085	.128	.061	.020			.012	.002	.005				
92	52.63	17.62	6.49	3.10	5.64	8.62	3.38	1.73	0.79		0.07	0.47	trace	SO ₂ BaO SrO Li ₂ O	trace 0.04 trace trace	100.58	
A2. II	.877	.173	.041	.043	.141	.153	.055	.019			.001	.003	—				
93	55.40	15.32	2.70	5.49	5.75	9.90	2.89	1.52	0.38	0.03	0.60	0.22	0.11	BaO SrO Li ₂ O	0.07 none trace	100.38	
A2. II	.923	.150	.017	.076	.144	.177	.047	.016			.008	.002	.002				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
78	II.5.3(4).4(5).	or 5.00 di 8.23 ab 31.96 hy 7.40 an 31.14 ol 11.67 mt 2.09 il 0.61	Lillooet, British Columbia.	M. F. Connor.	A. M. Bateman, Can. G. S. rec. lab.	Diorite.	
79	II''5.3(4).4''.	Q 0.48 di 15.28 or 6.12 hy 5.53 ab 29.34 mt 8.58 an 30.58 il 1.82	Olivine Ridge, Tulameen Dis- trict, British Columbia.	M. F. Connor.	C. Camsell, Can. G. S. Mem. 26, p. 71, 1913.	Augite syenite.	Pers. com.
80	II.5.3(4).4.	Q 1.80 di 5.32 or 9.45 hy 12.50 ab 26.72 mt 4.87 an 30.30 il 1.52 ap 4.70	Mount Tolmie, Victoria District, Vancouver Island, British Columbia.	M. F. Connor.	C. H. Clapp, Can. G. S. Mem. 36, p. 59, 1913.	Gabbro- diorite gneiss.	
81	II(III).4(5).3.4.	Q 7.08 di 14.29 or 7.78 hy 15.12 ab 25.68 mt 3.25 an 21.68 il 3.19 ap 0.54	Clalum Ridge, Kittitas County, Washington.	G. Steiger.	G. O. Smith, U. S. G. S. Fol. 106, p. 8, 1904.	Basalt.	
82	II.(4)5.3''4''.	Q 9.86 di 4.16 or 7.23 hy 9.52 ab 33.01 mt 4.18 an 28.63 il 2.13 ap 0.67	Llao Rock, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 140, 1902.	Secretion in dacite.	
83	II''5.3.4.	Q 2.28 di 10.47 or 7.78 hy 13.96 ab 29.87 mt 5.57 an 25.85 il 2.28 ap 1.01	Red Cone, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 161, 1902.	Basalt.	
84	II''5.3''4''.	Q 4.08 di 8.96 or 6.12 hy 23.03 ab 30.39 mt 1.62 an 25.38	Silver Lake, n. Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 79, p. 29, 1891.	Quartz basalt.	In W. T., p. 279.
85	II''.(4)5.3''4.	Q 7.44 hy 28.04 or 8.90 mt 3.02 ab 25.68 il 1.22 an 24.46	South of Burns Valley, Cali- fornia.	W. H. Melville.	G. F. Becker, U. S. G. S. Mon. 13, p. 159, 1888.	Basalt.	In W. T., p. 277.
86	II''.(4)5.3(4).4.	Q 7.08 di 8.31 or 9.45 hy 19.25 ab 25.15 mt 2.32 an 26.69 il 1.22 ap 0.34	Snag Lake, Cinder Cone, California.	W. F. Hille- brand.	J. S. Diller, A. J. S., XXXIII, p. 49, 1887.	Quartz basalt.	Also in U. S. G. S. B. 79, p. 29, 1891. In W. T., p. 279.
87	II(III).5.3.4.	Q 3.90 di 11.44 or 9.45 hy 20.04 ab 28.30 mt 1.86 an 23.07 il 1.22 ap 0.34	Cinder Cone, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 79, p. 29, 1891.	Quartz basalt.	Bomb. In W. T., p. 279.
88	II.5.3''4.	Q 3.72 di 9.67 or 9.45 hy 17.41 ab 29.34 mt 2.09 an 27.24 il 1.06 ap 0.34	Cinder Cone, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 79, p. 29, 1891.	Quartz basalt.	In W. T., p. 279.
89	II''5.3.4.	Q 1.14 di 10.75 or 8.90 hy 21.86 ab 30.39 mt 2.09 an 24.46	Lake Bidwell, Cinder Cone, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 79, p. 29, 1891.	Quartz basalt.	In W. T., p. 279.
90	II''5.3(4).4.	Q 2.04 di 9.21 or 8.34 hy 22.06 ab 27.77 mt 2.09 an 28.36	Cinder Cone, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 79, p. 29, 1891.	Quartz basalt.	In W. T., p. 279.
91	II.(4)5.3.4.	Q 9.48 di 6.15 or 11.12 hy 6.79 ab 31.96 mt 5.10 an 25.85 il 1.82 ap 0.67	Mill Creek, Shasta County, California.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 196, 1887.	Hypersthene andesite.	In W. T., p. 279.
92	II.5.3''4.	Q 3.12 di 8.86 or 10.56 hy 10.13 ab 28.82 mt 9.51 an 27.52 il 0.15 ap 1.34	Burney Butte, Shasta County, California.	R. B. Riggs.	J. S. Diller, U. S. G. S. B. 148, p. 200, 1887.	Basalt.	In W. T., p. 279.
93	II(III)''5.3''4.	Q 5.46 di 18.63 or 8.90 hy 12.39 ab 24.63 mt 3.94 an 24.19 il 1.22 ap 0.67	Near Emigrant Gap, Placer County, Cali- fornia.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 212, 1887.	Gabbro.	In W. T., p. 279.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
94	55.20	18.68	3.14	4.42	4.59	8.02	3.66	1.01	0.51		0.92	0.24	0.14	BaO 0.03 SrO 0.02 Li ₂ O none	100.58	
A2. II	.920	.183	.020	.061	.115	.143	.059	.011			.012	.002	.002			
95	56.88	18.25	2.35	4.45	4.07	7.53	3.29	1.42	0.50	0.24	0.45	0.30	0.18	BaO 0.11 SrO 0.04 Li ₂ O trace	100.06	
A2. II	.948	.179	.015	.062	.102	.134	.053	.015			.006	.002	.003			
96	50.56	14.71	3.54	8.90	4.07	7.58	2.94	2.10	1.12	1.06	1.71	1.14	0.13	BaO 0.25 SrO trace	99.81	
A2. II	.843	.144	.022	.122	.102	.135	.047	.022			.021	.008	.002			
97	55.86	19.30	0.91	4.78	2.94	7.31	3.52	1.52	1.23	0.19	1.20	0.38	0.16	CO ₂ none NiO trace FeS ₂ 0.39 BaO 0.13 SrO 0.04	99.86	
A1. I	.931	.189	.006	.067	.074	.130	.056	.016			.015	.003	.002			
98	55.18	17.35	2.77	3.90	4.80	7.98	3.42	1.42	1.52	0.16	0.83	0.20	0.15	CO ₂ none FeS ₂ 0.28 NiO 0.03 BaO 0.04 SrO 0.06	100.09	
A1. I	.920	.170	.017	.054	.120	.143	.055	.015			.010	.001	.002			
99	56.81	18.36	2.48	3.94	4.75	6.43	4.18	1.36	1.17		trace	0.25			99.73	2.74
A3. III	.947	.180	.016	.055	.119	.114	.068	.015			—	.002				
100	53.98	17.86	4.61	2.27	3.30	7.55	4.19	2.59	0.50	0.56	1.10	0.61	0.13	CO ₂ 0.21 SO ₃ 0.17 S 0.01 BaO 0.28 SrO 0.14	100.06	
A1. I	.900	.175	.029	.032	.083	.135	.068	.028			.014	.004	.002			
101	52.55	17.61	4.24	4.98	4.17	8.02	3.41	1.49	2.13	0.25	0.86	0.36	0.23	CO ₂ none S 0.02 BaO 0.04 SrO 0.02 Li ₂ O none	100.38	
A1. I	.876	.173	.026	.069	.104	.143	.055	.016			.011	.003	.003			
102	51.89	15.28	3.10	3.60	8.68	7.38	3.27	2.56	1.37	1.17	0.91	0.61	0.12	CO ₂ none ZrO ₂ trace NiO 0.02 BaO 0.15 SrO 0.09	100.21	
A1. I	.885	.150	.019	.050	.217	.132	.053	.028			.011	.004	.002			
103	50.12	18.52	2.47	4.11	2.68	8.99	5.22	1.46	3.09	1.64	1.33	0.18	trace	SO ₃ 0.08 Cr ₂ O ₃ trace NiO none BaO 0.02	99.91	2.732
A1. I	.835	.182	.016	.057	.067	.161	.084	.016			.016	.001	—			
104	49.60	16.56	4.28	4.44	5.38	9.22	3.31	1.25	2.58	1.44	1.86	0.30	0.08	SO ₃ 0.17 Cr ₂ O ₃ 0.03 NiO none BaO 0.05	100.55	2.825
A1. I	.827	.162	.027	.062	.135	.164	.053	.013			.024	.002	.001			
105	56.40	15.99	3.26	3.82	3.54	6.98	3.83	1.91	2.47		1.14	0.32	0.12		99.78	2.797
A2. II	.940	.157	.020	.053	.089	.125	.062	.020			.014	.002	.002			
106	58.07	15.83	2.97	3.89	5.56	6.70	3.89	1.73	0.23	0.18	1.27	0.29	0.06	Cr ₂ O ₃ 0.01 BaO 0.07 SrO 0.04 Li ₂ O trace	100.79	
A1. I	.968	.155	.019	.054	.139	.120	.063	.018			.016	.002	.001			
107	51.98	17.20	8.22	2.00	5.41	8.17	3.84	0.90	0.62		0.36	0.99			99.69	2.72
A2. II	.866	.109	.051	.028	.135	.146	.062	.010			.005	.007				
108	51.82	18.13	0.75	6.88	7.81	8.60	3.74	0.91	0.62	0.21	1.06	0.01		S. 0.02	100.46	
A2. II	.864	.178	.005	.096	.195	.154	.080	.010			.013	—				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
94	II."5.3(4).4".	Q 6.30 di 5.13 or 6.12 hy 13.13 ab 30.92 mt 4.64 an 31.41 il 1.82 ap 0.67	Bidwell's road, Butte County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 196, 1887.	Hypersthene andesite.	In W. T., p. 279.
95	II.(4)5.3(4).4.	Q 9.36 di 3.62 or 8.34 hy 14.25 ab 27.77 mt 3.48 an 30.86 il 0.91 ap 0.67	Franklin Hill, Plumas County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17 (I), p. 731, 1896.	Hypersthene andesite.	In W. T., p. 289.
96	II(III).5.3."4.	Q 3.78 di 7.61 or 12.23 hy 17.11 ab 24.63 mt 5.10 an 20.85 il 3.19 ap 2.69	Near Mount Ingalls, Plumas County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14 (II), p. 491, 1894.	Basalt.	Also in A. J. S. XLIV, p. 458, 1892. In W. T., p. 279.
97	II.(4)5.3(4).4.	Q 8.40 di 0.68 or 8.90 hy 13.40 ab 29.34 mt 1.39 an 32.53 il 2.28 ap 1.01	Tuolumne River, Amador County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17 (I), p. 702, 1896.	Diorite.	In W. T., p. 279.
98	II.(4)5.3"4.	Q 6.66 di 8.90 or 8.34 hy 11.57 ab 28.82 mt 3.94 an 27.80 il 1.52 ap 0.34	Tuolumne River, Amador County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17 (I), p. 702, 1896.	Diorite porphyry.	In W. T., p. 279.
99	II."5.3.4".	Q 5.28 di 2.00 or 8.34 hy 16.08 ab 35.63 mt 3.71 an 26.97 ap 0.67	Telegraph Canyon, Berkeley Hills, California.	C. Palache.	Lawson and Palache, Un. Cal., Dep. G., B. II, p. 426, 1901.	Andesite.	
100	II.5.3.4.⊙	Q 2.40 di 9.29 or 15.57 hy 4.00 ab 35.63 mt 4.18 an 21.96 il 2.13 hm 1.76 ap 1.34	Panamint Range, California.	W. F. Hille- brand.	J. E. Spurr, U. S. G. S. B. 228, p. 253, 1904.	Aleutite.	
101	II."5.3"4.	Q 4.56 di 8.96 or 8.90 hy 11.66 ab 28.82 mt 6.03 an 28.36 il 1.67 ap 1.01	Fremont Peak, Mojave Desert, California.	W. F. Hille- brand.	J. E. Spurr, U. S. G. S. B. 228, p. 253, 1904.	Quartz diorite.	
102	II(III).5.3.(3)4.	or 15.57 di 10.96 ab 27.77 hy 9.59 an 19.18 ol 6.98 mt 4.41 il 1.67 ap 1.34	San Joaquin River, Madera County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. B. 168, p. 218, 1900.	Basalt.	In W. T., p. 279.
103	II.5"3.4.	or 8.90 di 17.09 ab 32.49 ol 1.25 an 22.80 mt 3.71 ne 6.25 il 2.43 ap 0.34	Bella Vista Ranch, San Mateo County, California.	E. T. Allen.	Haehl and Arnold, Fr. Am. Phil. Soc., XLIII, p. 50, 1904.	Diabase.	
104	II"5.3"4.	Q 1.86 di 13.34 or 7.23 hy 8.82 ab 27.77 mt 6.26 an 26.69 il 3.65 ap 0.67	Mindego Hill, San Mateo County, California.	E. T. Allen.	Haehl and Arnold, Fr. Am. Phil. Soc., XLIII, p. 50, 1904.	Diabase.	
105	II.(4)5.3.4.	Q 8.28 di 11.09 or 11.12 hy 6.38 ab 32.49 mt 4.64 an 20.85 il 2.13	Sutro Tunnel, Washoe, Nevada.	G. E. Moore.	G. F. Becker, U. S. G. S. Mon. 3, Table I, 1882.	Diabase (pyroxene andesite).	Also in Hague and Iddings, U. S. G. S. B. 17, p. 33, 1885. In W. T., p. 279.
106	II.(4)5.3.4.	Q 8.16 di 8.58 or 10.01 hy 12.48 ab 33.01 mt 4.41 an 20.57 il 2.43 ap 0.67	Tlamacas, Popocatepetl, Mexico.	F. N. Guild.	F. N. Guild, A. J. S., XXII, p. 164, 1906.	Hypersthene andesite.	
107	II."5.3"4(5).	Q 4.74 di 5.62 or 5.56 hy 10.90 ab 32.49 mt 5.34 an 26.97 il 0.76 hm 4.48 ap 2.35	Cerro de Guadalupe, Puebla, Mexico.	A. Röhrig.	A. Hoppe in Felix and Lenk, Btr. G. Mex., II, p. 211, 1899.	Basalt.	In W. T., p. 279.
108	II"5.3(4).4"	or 5.56 di 10.36 ab 31.44 hy 4.02 an 30.02 ol 14.40 mt 1.16 il 1.98	Higuera Plateau, n. Jorullo, Mexico.	F. Roel.	E. Ordóñez, Cong. G. Int., X, Guide XI, p. 55, 1906.	Basalt.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
109	50.83	18.90	2.95	6.86	3.06	7.92	3.20	2.44	0.70	1.06	1.08	0.66	0.19		99.85	
A2. II	.847	.185	.019	.095	.077	.141	.052	.026			.014	.005	.003			
110	54.36	14.27	6.28	3.04	5.87	7.50	3.35	2.22	1.21		0.30	0.33	1.19	CO ₂ trace ZrO ₂ trace Cl 0.02 FeS ₂ 0.02 CaO none BaO 0.02 Cu 0.06 Pb none	100.04	
A1. I	.906	.140	.039	.042	.147	.134	.054	.023			.004	.002	.017			
111	52.19	15.47	8.30	3.65	4.59	8.26	2.77	1.48	0.90		1.24	0.10	0.13	CO ₂ 0.15 ZrO ₂ none Cl 0.13 FeS ₂ 0.26 CoO none BaO 0.08 Cu trace Pb none	99.70	
A1. I	.870	.151	.052	.051	.115	.147	.061	.016			.016	.001	.002			
112	56.91	18.18	4.65	3.61	3.49	7.11	4.02	1.61	0.36			0.25			100.19	
A3. III	.949	.178	.029	.050	.087	.127	.064	.017				.002				
113	59.61	18.66	3.03	4.00	2.50	6.60	4.27	1.56	n. d.			0.11			100.34	2.678
A3. III	.994	.183	.019	.056	.063	.118	.069	.017	—			.001				
114	56.23	15.25	6.13	3.60	5.38	7.35	4.18	1.50	0.23		0.48				100.33	2.77
A3. III	.937	.150	.038	.050	.134	.131	.068	.016			.006					
115	50.97	15.56	4.43	7.62	4.28	7.05	5.04	1.26	1.58		1.98	0.43	0.38	S 0.16	100.74	2.919
A2. II	.850	.153	.027	.106	.107	.126	.081	.014			.025	.003	.005			
116	54.15	19.30	3.61	3.54	2.75	8.00	3.75	3.19	1.24		0.69	0.45	0.12		100.79	
A2. II	.903	.189	.023	.049	.069	.143	.060	.034			.009	.003	.002			
117	49.30	17.31	3.84	5.73	5.12	8.67	4.05	1.73	2.18		2.16	0.26	0.14	CO ₂ 0.16 S 0.01	100.66	
A2. II	.823	.170	.024	.079	.128	.155	.066	.018			.027	.002	.002			
118	54.92	17.46	4.40	3.09	2.66	7.42	4.53	3.03	1.12		0.51	0.24	0.07	X 0.13	99.58	2.773
A2. II	.915	.171	.028	.043	.067	.132	.073	.032			.006	.002	.001			
119	47.85	16.59	4.32	6.16	4.79	9.84	3.72	2.08	2.61		1.18	0.23		X 0.18 S 0.10	99.65	2.905
A2. II	.798	.163	.027	.086	.120	.176	.060	.022			.015	.002				
120	56.22	16.33	3.11	7.94	2.99	5.63	3.84	1.65	1.63	0.88			0.11		100.33	
A2. II	.937	.160	.019	.110	.075	.101 0	.062	.018					.002			
121	50.70	14.60	5.23	7.68	4.15	7.20	3.71	1.33	1.15	2.08	1.89	0.49	0.42	NiO trace BaO 0.08 SrO trace	100.71	
A2. II	.845	.143	.033	.107	.104	.129	.060	.014			.024	.003	.006			
122	50.33	19.97	2.81	6.23	3.24	8.03	4.30	1.19	0.99	0.87	1.81	0.17	0.17	S none Cr ₂ O ₃ trace NiO trace BaO 0.06 SrO trace	100.17	2.81
A1. I	.839	.196	.018	.086	.081	.143	.069	.013			.023	.001	.002			
123	46.13	17.07	6.61	8.20	4.38	7.15	3.58	1.19	1.71	0.59	3.60	0.09	0.28	Cr ₂ O ₃ trace V ₂ O ₅ 0.03	100.61	2.91
A2. II	.769	.167	.041	.114	.110	.128	.058	.013			.045	—	.004			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
109	II.5.3''./4.	Q 0.36 di 3.93 or 14.46 hy 14.37 ab 27.25 mt 4.41 an 29.75 il 2.13 ap 1.68	Chorcha Mountain, Chiriqui Province, Panama.	W. C. Wheeler.	D. F. McDonald, U. S. G. S. rec. lab.	Andesite.	
110	II(III)''5.3.4.	Q 5.46 di 14.01 or 12.79 hy 10.22 ab 28.30 mt 9.05 an 17.51 il 0.61 ap 0.67	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Gui., p. 40, 1908.	Diorite gneiss.	MnO high? In W. T., p. 279.
111	II''./5.3.4.	Q 4.50 di 15.12 or 8.90 hy 4.60 ab 31.96 mt 8.58 an 20.57 il 2.43 hm 2.40 ap 0.34	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Gui., p. 96, 1908.	Proterobase.	In W. T., p. 281.
112	II.(4)5.3.4.	Q 8.28 di 5.13 or 9.45 hy 9.01 ab 33.54 mt 6.73 an 26.97 ap 0.67	Purgatorio, Pasto Volcano, Colombia.	R. Küch.	R. Küch, G. Stud. Colomb., I, p. 139, 1892.	Pyroxene andesite.	In W. T., p. 281.
113	''II.(4)5.3.4.	Q 9.96 di 4.11 or 9.45 hy 9.16 ab 36.15 mt 4.41 an 26.97 ap 0.34	Yana-sacha, Cotopaxi Volcano, Ecuador.	A. Young.	A. Young, Hochgeb. Rep. Ec., II (2), p. 264, 1902.	Andesite.	
114	II''./5.3.4.	Q 5.64 di 14.14 or 8.90 hy 7.80 ab 35.63 mt 8.82 an 18.35 il 0.91	Tunguragua Volcano, Ecuador.	A. Lindner.	F. Tannhäuser in W. Reiss, Ecuador, II, p. 144, 1904.	Dacite.	
115	II''5.(2)3.4(5).	or 7.78 di 13.20 ab 41.65 ol 8.74 an 16.12 mt 6.26 ne 0.42 il 3.80 ap 1.01	Cordillera de Dona Ana, Coquimbo, Chile.	F. Soenderop.	F. Wolff, Z. D. G. G., LI, p. 529, 1899.	Augite kersantite.	In W. T., p. 281.
116	II.5.3.(3)4.	Q 1.38 di 8.47 or 18.90 hy 5.35 ab 31.44 mt 5.34 an 26.41 il 1.37 ap 1.01	Cerro Pinto, Skyring Water, Patagonia, Chile.	G. Nyblom.	P. D. Quensel, B. G. Inst. Ups., XI, p. 100, 1911.	Shoshonite.	
117	II''5.3.4.	or 10.01 di 13.77 ab 31.44 ol 7.30 an 23.91 mt 5.57 ne 1.70 il 4.10 ap 0.67	Cerro Cogual, Patagonia, Chile.	G. Nyblom.	P. D. Quensel, B. G. Inst. Ups., XI, p. 80, 1911.	Essexite.	
118	II.5.(2)3.4.	Q 1.14 di 13.00 or 17.79 hy 1.86 ab 38.25 mt 6.50 an 18.35 il 0.91 ap 0.67	Cerro de Poca, Cordoba, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 602, 1906.	Pyroxene andesite.	
119	II(III).5''3.4.	or 12.23 di 19.78 ab 22.27 ol 5.96 an 22.52 mt 6.26 ne 4.97 il 2.28 ap 0.67	Alemania, Salta, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 626, 1906.	Essexite.	
120	II.(4)5.3.4.	Q 8.28 di 4.92 or 10.01 hy 17.29 ab 32.49 mt 4.41 an 22.24	Caribber, Linthgow, Scotland.	G. S. Blake.	J. D. Falconer, Tr. R. Soc. Ed., XLV, p. 147, 1908.	Diabase.	
121	II(III).5.3.4.	Q 3.18 di 11.34 or 7.78 hy 12.25 ab 31.44 mt 7.66 an 19.18 il 3.65 ap 1.01	Fiom-m-chro, Rum Island, Scotland.	E. G. Radley.	A. Harker, G. S. Scot. Mem., G. Sm. Islands, p. 130, 1908.	Mugearite.	
122	II.5.3.4''.	or 7.23 di 5.94 ab 36.15 hy 3.58 an 31.69 ol 5.70 mt 4.18 il 3.50 ap 0.34	Druim na Criche, Portree, Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, p. 263, 1904.	Olivine dolerite.	
123	II''5.3''4''.	or 7.23 di 7.13 ab 30.39 hy 7.25 an 26.69 ol 2.88 mt 9.51 il 6.84	Broc Bheinn, Sligachan, Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, p. 248, 1904.	Olivine dolerite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
124	49.86	16.33	3.62	4.34	7.80	6.47	3.42	2.10	2.77	1.25	1.06	0.54	0.40	CO ₂ 0.23 S none Cr ₂ O ₃ trace NiO none BaO 0.10	100.29	
A1. I	.831	.160	.023	.060	.195	.116	.055	.022			.013	.004	.006			
125	46.45	16.98	3.94	8.57	5.94	7.64	3.50	1.43	1.68	0.24	3.11	0.51	0.48	CO ₂ 0.41 FeS ₂ 0.06 NiO none BaO none	100.94"	
A1. I	.774	.167	.025	.119	.149	.137	.056	.015			.039	.004	.007			
126	50.23	17.16	2.44	5.46	6.23	8.10	4.23	1.94	2.13		1.20	0.15		CO ₂ 0.03 ZrO ₂ 0.02 FeS ₂ 0.09 Cr ₂ O ₃ 0.07 BaO 0.06	99.73	2.890
A1. I	.837	.168	.015	.076	.156	.145	.068	.021			.015	.001				
127	54.42	15.34	0.67	5.17	6.69	8.30	4.21	1.01	2.60	0.47	0.72	0.57	trace	CO ₂ trace	100.17	
A2. II	.907	.150	.004	.072	.167	.148	.068	.011			.009	.004	—			
128	53.82	14.70	2.39	6.74	4.84	9.03	2.75	1.85	1.59	0.37	1.66	0.10	0.39	CO ₂ 0.10 NiO 0.03 BaO 0.02	100.38	
A1. I	.897	.144	.015	.093	.121	.161	.045	.020			.021	.001	.006			
129	52.37	18.05	3.40	4.27	5.53	6.18	4.36	1.97	1.83	0.32	1.16	0.18	0.28	CO ₂ 0.17 NiO none BaO 0.02 Li ₂ O trace	100.09	
A1. I	.873	.177	.021	.060	.138	.111	.070	.021			.015	.001	.004			
130	50.19	14.57	4.39	8.96	2.79	7.60	4.24	1.53	1.54	0.32	2.72	1.12	0.32	CO ₂ 0.02 Cl 0.05 NiO none BaO 0.03 Li ₂ O trace	100.42	
A1. I	.837	.143	.028	.125	.070	.136	.068	.016			.034	.008	.005			
131	54.10	14.70	2.21	11.50	1.56	6.94	3.47	1.52	1.00		2.65	0.37			100.02	
A2. II	.902	.144	.014	.160	.039	.124	.056	.016			.033	.003				
132	53.85	16.21	4.11	4.70	3.35	7.81	3.75	2.22	1.25		2.60	0.64			100.49	
A2. II	.898	.159	.026	.065	.084	.139	.061	.023			.033	.005			(100.48)	
133	53.21	18.40	1.22	4.69	2.50	6.72	4.32	2.54	1.76		2.33	0.32		FeS ₂ 2.95	100.96	
A2. II	.887	.180	.008	.065	.063	.120	.069	.027			.029	.002				
134	51.25	16.97	2.95	5.85	3.98	7.45	4.36	2.56	1.25		3.25	0.43			100.30	
A2. II	.854	.166	.019	.082	.100	.133	.070	.028			.041	.003				
135	48.51	16.08	2.48	7.66	5.32	8.57	4.02	2.60	1.25		3.07	0.23			99.79	
A2. II	.809	.158	.016	.107	.133	.154	.065	.028			.038	.002				
136	47.15	17.41	4.63	4.62	4.96	10.10	3.40	2.60	2.50		3.13	0.39			100.89	
A2. II	.786	.171	.029	.064	.124	.180	.055	.028			.039	.003				
137	52.25	17.60	5.90	3.51	3.15	7.70	5.15	2.25	n. d.		1.86	0.70			100.07	
A2. II	.871	.172	.037	.049	.079	.138	.083	.024			.023	.005				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
124	II''5.3.4.	or 12.23 di 4.42 ab 28.82 hy 12.61 an 23.07 ol 6.23 mt 5.34 il 1.98 ap 1.34	Cruach Arddhuine, Taynuilt, Argyll, Scotland.	E. G. Radley.	J. J. H. Teall, G. S. G. Br., Sum. Prog. (1913), p. 82, 1914.	Orthoclase- olivine basalt.	
125	II(III).5.3''4.	or 8.34 di 6.31 ab 29.34 hy 1.86 an 26.69 ol 13.19 mt 5.80 il 5.93 ap 1.34	Little Galdon Neck, Kilpatrick Hills, Glasgow, Scotland.	E. G. Radley.	G. W. Tyrrell, G. S. Scot. Mem., Glasg. Dist., p. 142, 1911.	Olivine basalt.	
126	II''5.3.4.	or 11.68 di 14.06 ab 28.82 ol 10.75 an 21.96 mt 3.48 ne 3.69 il 2.28 ap 0.34	Clec Hill, Ludlow, Shropshire, England.	P. Holland.	Reade and Holland, Pr. Liverp. G. Soc., X, p. 208, 1907.	Basalt.	
127	II(III)5.3.4(5).	Q 0.06 di 14.36 or 6.12 hy 17.54 ab 35.63 mt 0.93 an 19.74 il 1.37 ap 1.34	Penberry Head, Pembrokeshire, Wales.	J. V. Elsdén.	J. V. Elsdén, Q. J. G. S., LXI, p. 588, 1905.	Quartz norite.	
128	II(III)''5.3.4.	Q 5.16 di 17.92 or 11.12 hy 11.65 ab 23.58 mt 3.48 an 21.96 il 3.19 ap 0.34	Skomer Island, Pembrokeshire, Wales.	E. G. Radley.	H. H. Thomas, Q. J. G. S., LXVII, p. 205, 1911.	Basalt.	
129	II.5.3.4.⊙	or 11.68 di 4.88 ab 36.68 hy 8.22 an 23.91 ol 4.97 mt 4.87 il 2.28 ap 0.34	Grassholme Island, Pembrokeshire, Wales.	E. G. Radley.	H. H. Thomas, Q. J. G. S., LXVII, p. 200, 1911.	Marloesite.	
130	II(III).5.''3.4.	Q 1.62 di 11.60 or 8.90 hy 10.18 ab 35.63 mt 6.50 an 16.40 il 5.17 ap 2.69	Skomer Island, Pembrokeshire, Wales.	E. G. Radley.	H. H. Thomas, Q. J. G. S., LXVII, p. 202, 1911.	Mugearite.	
131	II''.(4)5.3.4.	Q 7.92 di 10.06 or 8.90 hy 13.62 ab 29.34 mt 3.25 an 20.02 il 5.02 ap 1.01	Brée, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 161, 1913.	Microgabbro.	
132	II.''5.3.4.	Q 6.42 di 10.25 or 12.79 hy 4.40 ab 31.96 mt 6.03 an 20.85 il 5.02 ap 1.68	Griou, Fournol, Cantal, France.	Pisani.	A. Lacroix, C. R., CXLIX, p. 546, 1909.	Andesite.	
133	II.5.3.4.⊙	Q 1.14 di 7.45 or 15.01 hy 6.38 ab 36.15 mt 1.86 an 23.35 il 4.41 ap 0.34 pr 2.95	Fournol, Cantal, France.	Pisani.	A. Lacroix, C. R., CXLIX, p. 546, 1909.	Micromonzonite.	
134	II.5.''3.4.	or 15.57 di 12.17 ab 34.84 ol 5.11 an 18.90 mt 4.41 ne 0.99 il 6.23 ap 1.01	Fournol, Cantal, France.	Pisani.	A. Lacroix, C. R., CXLIX, p. 546, 1909.	Monzonite.	
135	II(III).5(6).(2)3.4	or 15.57 di 18.45 ab 21.48 ol 8.24 an 18.07 mt 3.71 ne 6.82 il 5.78 ap 0.67	Fournol, Cantal, France.	Pisani.	A. Lacroix, C. R., CXLIX, p. 546, 1909.	Essexitic gabbro.	
136	II(III).5''3.''4.	or 15.57 di 17.71 ab 19.39 ol 2.94 an 24.46 mt 5.80 ne 5.11 il 5.93 hm 0.64 ap 1.01	Fournol, Cantal, France.	Pisani.	A. Lacroix, C. R., CXLIX, p. 546, 1909	Essexitic gabbro.	
137	II.5.(2)3.4.	or 13.34 di 12.10 ab 40.35 ol 1.61 an 18.07 mt 6.03 ne 1.70 il 3.50 hm 1.76 ap 1.68	Fontfroide, Puy de Dome, Auvergne.	Pisani.	A. Lacroix, pers. com.	Labradorite (basalt).	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
138	52.20	17.57	1.81	7.20	3.68	7.76	4.86	1.90	n. d.		2.08	0.58			99.64	
A2. II	.870	.172	.011	.100	.092	.139	.078	.020			.026	.004				
139	59.1	18.5	1.3	3.8	3.1	5.3	4.1	2.6	2.8						100.6	
B3. IV	.985	.181	.008	.053	.078	.095	.066	.028								
140	54.60	18.45	4.45	2.88	2.73	8.05	4.11	1.53	2.10		0.88				99.78	
A3. III	.910	.181	.028	.040	.068	.144	.066	.016			.011					
141	48.11	16.75	1.60	9.54	5.15	8.70	3.75	1.16	2.65		2.10	0.45			99.96	
A2. II	.802	.164	.010	.132	.129	.155	.061	.013			.026	.003				
142	47.41	16.88	2.51	9.91	5.51	8.50	3.61	0.81	1.20		2.65	0.44			99.43	
A2. II	.790	.166	.016	.138	.138	.152	.058	.009			.033	.003				
143	56.09	16.03	3.12	4.77	8.03	6.73	3.49	1.87	0.16		0.37				100.66	2.892
A3. III	.935	.157	.020	.062	.201	.120	.056	.020			.005					
144	48.06	16.95	4.78	7.60	5.51	7.79	3.37	1.42	0.80		2.57	0.63	trace		99.48	
A2. II	.801	.166	.030	.106	.138	.139	.054	.015			.032	.004	—			
145	52.29	14.99	6.77	3.70	5.95	7.62	4.16	2.26	1.65		0.24		0.50		100.13	
A2. II	.872	.147	.043	.051	.149	.136	.067	.024			.003		.007			
146	50.92	16.62	3.27	9.10	4.89	8.23	3.57	1.58	1.06		0.77	0.51	trace		100.52	2.957
A2. II	.849	.163	.020	.126	.122	.146	.058	.017			.010	.004	—			
147	50.72	16.32	5.68	5.40	6.24	6.14	3.50	1.48	3.36		0.70	0.51	trace		100.05	2.804
A2. II	.845	.160	.036	.075	.156	.110	.056	.016			.009	.004	—			
148	53.75	16.10	6.36	6.38	4.53	6.53	3.81	1.67	1.18				0.27	SO ₃ 0.09	100.62	
A3. III	.896	.158	.040	.089	.113	.116	.061	.018					.004			
149	55.05	16.26	3.83	3.31	5.34	7.61	3.37	1.49	1.93		1.01	0.20		SO ₃ 0.05 Org 0.08	99.53	2.796
A2. II	.918	.159	.024	.046	.134	.135	.055	.016			.013	.001				
150	53.58	15.84	2.98	4.90	7.16	7.86	2.99	1.63	2.54		.098	0.19		SO ₃ 0.16	100.75	2.760
A2. II	.893	.155	.019	.068	.179	.140	.048	.017			.012	.001				
151	53.31	20.05	2.18	3.37	3.33	8.65	4.17	1.30	2.02		1.16	0.18		CO ₂ 0.06 SO ₃ 0.20	99.98	2.746
A?2. II	.889	.196	.014	.048	.083	.154	.068	.014			.015	.001				
152	50.30	18.67	6.06	4.27	4.66	9.37	4.05	1.42	n. d.		1.84				100.64	
A3. III	.838	.183	.038	.060	.117	.168	.066	.015			.022					

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
138	II.5."3.4.	or 11.12 di 11.90 ab 37.99 ol 8.55 an 20.57 mt 2.55 ne 1.56 il 3.95 ap 1.34	Puy de Come, Puy de Dome, Auvergne.	Pisani.	A. Lacroix, pers. com.	Labradorite (basalt).	
139	"II."5.3.4.	Q 6.96 di 1.83 or 15.57 hy 12.84 ab 34.58 mt 1.86 an 24.19	Pic du Midi d'Ossan, Pyrennes, France.	Not stated.	J. de Lapparent, B. Soc. Min. Fr., XXXIV, p. 287, 1911.	Hypersthene dacite.	
140	II."5.3.4.	Q 6.36 di 9.75 or 8.90 hy 2.40 ab 34.58 mt 3.50 an 27.52 il 1.67	Cap d'Ail, Esterel, France.	Pisani.	A. Michel-Levy, B. Ser. Ct. G. Fr., XXI, No. 130, p. 41, 1912.	Labradorite (basalt).	
141	II(III).5.3.4".	or 7.23 di 12.62 ab 29.87 ol 14.24 an 25.02 mt 2.32 ne 1.14 il 3.95 ap 1.01	Les Adrets, Esterel, France.	Pisani.	A. Michel-Levy, B. Ser. Ct. G. Fr., XXI, No. 130, p. 41, 1912.	Melaphyre.	
142	II(III).5.3(4).4(5).	or 5.00 di 9.83 ab 30.39 hy 2.69 an 27.52 ol 13.22 mt 3.71 il 5.02 ap 1.01	Les Adrets, Esterel, France.	Pisani.	A. Michel-Levy, B. Ser. Ct. G. Fr., XXI, No. 130, p. 41, 1912.	Melaphyre.	
143	II(III).5.3.4.	Q 2.40 di 8.61 or 11.12 hy 20.89 ab 29.34 mt 4.64 an 22.52 il 0.76	Campo Maior, Alentejo, Portugal.	A. Merian.	A. Merian, N. J. B. B., III, p. 296, 1885.	Mica diorite.	In W. T., p. 281.
144	II(III).5.3".4.	or 8.34 di 6.48 ab 28.30 hy 12.63 an 26.97 ol 2.78 mt 6.96 il 4.86 ap 1.34	Hovland, n. Laurvik, Lougendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 75, 1899.	Bronzite kersantite.	In W. T., p. 281.
145	II(III).5.(2)3.4.	or 13.34 di 17.47 ab 35.11 hy 2.76 an 15.57 ol 3.91 mt 9.98 il 0.46	Prestberg, Ragunda, Jemtland, Sweden.	H. Santesson.	A. G. Högbom, Afh. Sv. G. Und., 182, p. 45, 1899.	Diabase.	Not in W. T.
146	II(III).5.3.4.	or 9.45 di 9.90 ab 30.39 hy 11.81 an 24.46 ol 6.38 mt 4.64 il 1.52 ap 1.34	Silfberg, Dalarne, Sweden.	O. Larsson.	M. Weibull, Lunds Un. Aars-Sk., XXXIII, No. 4, p. 28, 1897.	Enstatite porphyrite.	Not in W. T.
147	II".5.3.4.	Q 2.34 di 2.65 or 8.90 hy 18.30 ab 29.34 mt 8.35 an 24.46 il 1.37 ap 1.01	Lustigkulla Mine, Silfberg, Dalarne, Sweden.	O. Larsson.	M. Weibull, Lunds Un. Aars-Sk., XXXIII, No. 4, p. 24, 1897.	Diabase.	Not in W. T.
148	II".5.3.4.	Q 3.66 di 8.37 or 10.01 hy 14.21 ab 31.96 mt 9.28 an 21.96	Ostergard, n. Lammala, Kimito Island, Finland.	N. M. Slawsky.	P. P. Sustchinsky, Trav. Soc. Imp. St. P. XXXVI, p. 64, 1912.	Metabasite.	SO ₃ given as 3.09.
149	II.(4)5.3.4.	Q 7.74 di 9.60 or 8.90 hy 10.09 ab 28.82 mt 5.57 an 24.46 il 1.98 ap 0.34	Martinstein, Nahe District, Rheinland.	Jacobs.	K. Lossen, Jb. Pr. G. L.-A. (1889), p. 309, 1892.	Bronzite tholeyite.	In W. T., p. 281.
150	II(III).5.3".4.	Q 3.60 di 10.34 or 9.45 hy 17.89 ab 25.15 mt 4.41 an 25.02 il 1.82 ap 0.34	Mittweiler, Nahe District, Rheinland.	A. Hesse.	A. Leppla, Erl. Bl. Friessen, G. Kte. Pr., XLVI, p. 35, 1894.	Melaphyre.	In W. T., p. 281.
151	II.5.3.4".	Q 1.80 di 8.21 or 7.78 hy 6.88 ab 35.63 mt 3.25 an 31.69 il 2.28 ap 0.34	Sattel, Niederkirchen, Nahe District, Rheinland.	Gremse.	K. Lossen, Jb. Pr. G. L.-A. (1889), p. 309, 1892.	Dolerite.	Al ₂ O ₃ and MgO? In W. T., p. 281.
152	II.5.3.4".	or 6.34 di 14.26 ab 33.54 ol 3.57 an 28.36 mt 8.82 ne 0.67 il 3.34	Ermensbach, Vosges, Alsace.	Loscher.	W. Deecke, Z. D. G. G., XLIII, p. 873, 1891.	Diabase.	In W. T., p. 281.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
153	54.13	16.17	3.36	4.76	6.76	7.48	2.89	1.63	2.72		trace	0.19		SO ₃ 0.16	100.25	2.625
A3. III	.902	.158	.021	.066	.169	.134	.047	.017			—	.001				
154	56.22	17.59	2.78	5.05	3.96	6.47	3.68	1.33	0.83	0.12	1.19	0.11		CO ₂ 0.19 FeS ₂ 0.24	99.76	
A2. II	.937	.172	.018	.070	.097	.115	.060	.014			.015	.001				
155	54.28	19.27	0.64	6.27	3.29	5.01	5.73	2.23	1.30	0.33	0.80	0.37		CO ₂ 0.35 SO ₃ 0.25	100.12	
A2. II	.905	.189	.004	.088	.082	.089	.092	.023			.010	.003				
156	50.45	18.90	7.73	2.61	5.41	9.00	3.92	1.05	0.10	0.18	0.27	0.52			100.14	
A2. II	.841	.185	.048	.036	.135	.161	.063	.011			.003	.004				
157	58.34	18.08	3.23	3.87	2.07	5.76	5.65	1.30	0.55	0.05	1.07	0.22		CO ₂ 0.12 SO ₃ 0.07	100.36	
A2. II	.972	.177	.020	.054	.052	.103	.091	.014			.013	.002				
158	51.22	17.48	3.42	6.09	5.40	8.00	3.65	1.59	1.06	0.10	1.36	0.18		CO ₂ 0.27 SO ₃ 0.39	100.20	
A2. II	.854	.171	.021	.085	.135	.143	.059	.017			.017	.001				
159	51.14	19.65	2.29	5.62	4.26	7.96	3.94	1.37	1.02	0.35	1.54	0.49		CO ₂ 0.18 SO ₃ trace	99.81	
A2. II	.852	.193	.014	.078	.107	.142	.064	.015			.019	.004				
160	52.73	14.35	4.37	7.60	5.13	7.26	3.57	0.82	1.33		2.34	0.46	trace	CO ₂ 0.22 Cl trace F trace Cr ₂ O ₃ trace BaO trace	100.18	2.872
A2. II	.879	.141	.027	.106	.128	.130	.058	.009			.028	.003	—			
161	50.92	17.92	1.72	5.96	6.53	8.32	3.24	2.12	2.09	0.23	0.90			FeS ₂ 0.21	100.21	
A3. III	.849	.176	.011	.083	.163	.148	.052	.022			.011					
162	49.97	16.38	3.62	6.76	7.50	8.95	3.22	1.55	2.18					Cl 0.06	100.19	2.84
A3. III	.833	.160	.022	.094	.188	.160	.052	.017								
163	54.08	16.62	3.38	9.18	1.22	4.80	3.71	1.79	2.10		1.69	0.42	0.63	CO ₂ 0.07 S 0.12	99.81	
A2. II	.901	.163	.021	.128	.031	.086	.060	.019			.021	.003	.009			
164	49.56	16.32	3.69	6.97	7.50	8.83	2.91	1.87	2.36					Cl. 0.07	100.08	2.88
A3. III	.826	.160	.023	.097	.188	.157	.047	.020								
165	53.78	16.02	1.27	6.84	6.49	8.45	2.47	1.81	1.45		0.81	0.17		SO ₃ 0.23 FeS ₂ 0.19	99.98	2.897
A2. II	.896	.157	.008	.095	.162	.151	.040	.019			.010	.001				
166	49.93	16.12	5.01	6.28	6.40	8.93	3.87	1.41	0.44		0.72	0.21		CO ₂ 0.20 SO ₃ 0.19	99.71	2.928
A2. II	.832	.158	.031	.088	.160	.169	.063	.015			.009	.002				
167	49.84	17.06	3.26	7.64	5.44	9.80	3.27	1.43	0.96		1.42	0.03		SO ₂ 0.04	100.19	2.964
A2. II	.831	.167	.020	.106	.136	.175	.053	.015			.018	—				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
153	II''/5.3''4.	Q 4.74 di 8.25 or 9.45 hy 13.88 ab 24.03 mt 4.87 an 26.13 ap 0.34	Die Wacht, n. Eulenhis, Rheinpfalz.	H. Haefcke.	A. Leppla, Jb. Pr. G. L.-A. XIV (1893), p. 146, 1894.	Melaphyre.	In W. T., p. 281.
154	II.(4)5.3''4.	Q 8.82 di 3.16 or 7.78 hy 13.26 ab 31.44 mt 4.18 an 27.24 il 2.28 ap 0.34	Near Ober Ram- stadt, Odenwald, Hesse.	K. M. Jene.	G. Klemm, Nb. Ver. Erdk. (4), XXVIII, p. 30, 1907.	Malchite.	
155	''II.5.(2)3.4.	or 12.79 di 1.14 ab 45.85 ol 12.87 an 20.57 mt 0.93 ne 1.28 il 1.52 ap 1.01	Kirschhäuser Thal, Odenwald, Hesse.	Stadler.	G. Klemm, Nb. Ver. Erdk. (4), XXVIII, p. 30, 1907.	Malchite.	
156	II.5.3(4).4(5).	Q 0.18 di 7.99 or 6.12 hy 9.30 ab 33.01 mt 7.66 an 30.86 il 0.46 hm 2.40 ap 1.34	Lichtenberg, Odenwald, Hesse.	Surv. lab.	C. Chelius, Nb. Ver. Erdk. (4), XIV, p. 2, 1893.	Hypersthene diorite.	In W. T., p. 281
157	II.(4)5.''3.4(5).	Q 6.06 di 5.40 or 7.78 hy 5.35 ab 47.68 mt 4.64 an 20.02 il 1.98 ap 0.67	Ludwigsbrunnen, Eberstadt, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 34, 1912.	Diorite.	
158	II.5.3''4.	or 9.45 di 7.85 ab 30.92 hy 9.64 an 29.19 ol 4.54 mt 4.87 il 2.58 ap 0.34	Biegelsberg, n. Eberstadt, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 34, 1912.	Diorite.	
159	II.5.3''4.	or 8.34 di 3.37 ab 33.54 hy 11.26 an 31.69 ol 2.73 mt 3.25 il 2.89 ap 1.34	Kohlberg, n. Darmstadt, Hesse.	K. M. Jene.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 24, 1912.	Diabase.	
160	II(III).(4)5.3.4(5).	Q 6.88 di 10.36 or 5.00 hy 13.99 ab 30.39 mt 6.25 an 20.57 il 4.26 ap 1.01	Rüdighcim, n. Hanau, Hesse.	T. Petersen.	T. Petersen, Ref. N. J., 1894, I, p. 460.	Basalt.	In W. T., p. 327.
161	II.5.3''4.	or 12.23 di 10.39 ab 27.25 hy 4.35 an 28.86 ol 10.81 mt 2.55 il 1.67	Teufelstrappen, Hesse.	Surv. Lab.	G. Klemm, Erl. G. Kt. Hes., Bl. Birkenau, p. 26, 1905.	Diorite.	
162	II(III).5.3''4.	or 9.45 di 15.51 ab 27.25 hy 0.76 an 25.30 ol 14.51 mt 5.10	Krötenkopf, Hesse.	H. Wolff.	K. Oebbeke, Jb. Pr. G. L.-A. (1888), p. 393, 1889.	Basalt	In W. T., p. 323.
163	II.(4)5.3.4.	Q 8.94 hy 15.64 or 10.56 mt 4.87 ab 31.44 il 3.19 an 21.13 ap 1.01 C 0.82	Near Silberberg, Brocken, Harz.	Jacobs.	O. H. Erdmanns- doerfer, Jb. Pr. G. L.-A., XXVII, (1906), p. 357, 1908.	Quartz diorite.	
164	II(III).5.3.''4.	or 11.12 di 14.40 ab 24.03 hy 2.39 an 25.85 ol 13.02 mt 5.34	Eisenberg, Hesse.	H. Wolff.	K. Oebbeke, Jb. Pr. G. L.-A., (1888), p. 394, 1889.	Basalt	In W. T., p. 323.
165	II(III)5.3(4).''4.	Q 3.42 di 11.31 or 10.56 hy 20.85 ab 20.96 mt 1.86 an 27.24 il 1.52 ap 0.34	Elfenstein, Brocken, Harz.	Haefcke.	O. H. Erdmanns- doerfer, Jb. Pr. G. L.-A., XXVII (1906), p. 359, 1908.	Biotite gabbro.	
166	II(III).5.3.4.	or 8.34 di 16.16 ab 31.96 ol 10.45 an 22.24 mt 7.19 ne 0.57 il 1.37 ap 0.67	Bleichethal, n. Harzburg, Harz.	Winter.	O. H. Erdmanns- doerfer, Jb. Pr. G. L.-A., XXV (1904) p. 38, 1907.	Diabase.	
167	II(III).5.3''4.	or 8.34 di 17.22 ab 27.77 hy 1.99 an 27.52 ol 8.88 mt 4.64 il 2.74	Steinerne Rennen, Harz.	Heuseler.	O. H. Erdmanns- doerfer, Jb. Pr. G. L.-A., XXXII, (II), p. 365, 1912.	Diabase hornfels.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
168	51.93	17.90	6.12	3.19	3.99	7.29	4.11	3.42	0.53	0.09	1.22				99.79	2.867
A3. III	.866	.175	.038	.044	.100	.130	.066	.036			.015					
169	56.2	19.7	3.9	1.1	3.7	7.2	3.7	2.0	2.1						99.6	
B3. IV	.937	.193	.024	.015	.093	.129	.060	.021								
170	55.24	15.90	4.68	3.85	5.25	8.40	3.52	2.16	1.36						100.36	
A3. III	.921	.156	.029	.054	.131	.150	.056	.023								
171	54.13	16.17	3.36	4.76	6.76	7.48	2.89	1.63	2.72		trace	0.19		SO ₂ 0.16	100.25	
A3. III	.902	.159	.021	.066	.169	.134	.047	.017			—	.001				
172	52.78	16.08	0.74	8.33	3.50	10.72	2.87	1.33	2.54		2.08		trace	Cr ₂ O ₃ trace	100.97	
B3. IV	.880	.158	.005	.115	.085	.191	.047	.014			.026		—			
173	50.44	17.03	1.50	11.02	5.01	8.28	3.02	2.53	0.32		0.72		0.18		100.05	3.011
A2. II	.841	.167	.009	.153	.125	.148	.048	.027			.009		.003			
174	55.54	17.80	5.20	3.07	2.59	5.69	4.22	2.90	1.75		trace	0.52		SO ₂ 0.64	99.92	
A3. III	.926	.175	.033	.043	.065	.102	.068	.031			—	.004				
175	44.85	18.08	7.71	3.23	4.16	9.97	3.19	2.82	2.56	0.46	1.78	1.55			100.36	2.839
A2. II	.748	.177	.048	.045	.104	.178	.051	.030			.022	.011				
176	54.42	14.11	3.65	6.13	3.94	6.59	3.95	2.03	0.60	0.80	1.95	0.98	0.93	F 0.47	100.55	
A2. II	.907	.138	.023	.085	.099	.118	.064	.021			.024	.007	.013			
177	56.89	16.95	4.85	3.72	3.12	4.92	4.09	2.41	2.23		0.28	0.15		SrO trace	99.61	
A2. II	.948	.166	.031	.051	.078	.088	.066	.025			.004	.001				
178	51.65	16.33	4.68	5.73	4.75	8.02	3.97	1.57	2.16		0.54	0.10	0.20	SrO 0.05	100.15	
A2. II	.861	.160	.029	.079	.119	.143	.065	.017			.007	.001	.003			
179	58.20	19.20	2.01	4.42	3.25	5.60	4.53	1.81	1.28		0.21	0.33			100.84	
A2. II	.970	.188	.013	.061	.081	.100	.073	.020			.003	.002				
180	45.75	15.85	7.40	5.82	6.90	7.20	3.44	1.33	3.20		1.68	0.55	0.31	S 0.18	99.61	
A2. II	.763	.155	.046	.080	.173	.128	.055	.014			.020	.004	.004			
181	51.39	17.65	3.43	7.14	5.01	7.76	2.93	2.56	1.18			1.09		S 0.17	100.31	
A3. III	.857	.173	.021	.099	.125	.139	.047	.028				.008				
182	50.35	17.07	4.58	6.49	3.50	7.70	3.58	3.12	1.45		1.23	0.64	trace	CO ₂ 0.47	100.18	
A2. II	.839	.168	.029	.090	.088	.138	.058	.033			.015	.005	—			
183	48.88	16.99	4.73	6.88	4.37	10.02	3.56	2.17	0.63		1.17	0.35	0.39		100.14	
A2. II	.815	.167	.029	.096	.109	.179	.058	.023			.015	.002	.005			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
168	II.5."3.(3)4.	or 20.02 di 12.31 ab 30.92 ol 3.01 an 20.29 mt 6.73 ne 1.99 il 2.28 hm 1.44	Gröba, n. Riesa, Saxony.	H. Hirschi.	H. Hirschi, In Diss. Zür., p. 23, 1901.	Syenite.	
169	"II.5''3''4.	Q 7.02 di 3.67 or 11.68 hy 7.60 ab 31.44 mt 3.48 an 31.14 hm 1.44	Ober-Buchwald, Riesengebirge.	W. Herz.	L. Milch, N. J. Cb., 1902, p. 677.	Malchite.	
170	II''5.3.4.	Q 3.84 di 16.15 or 12.79 hy 8.72 ab 29.34 mt 6.73 an 21.41	Königreicher Hof, Blatt Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 25, 1910.	Basaltic melaphyre.	
171	II''5.3(4).4.	Q 4.68 di 8.04 or 9.45 hy 18.98 ab 24.63 mt 4.87 an 26.41 ap 0.34	Eulenbis, Blatt Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 39, 1910.	Melaphyre.	
172	II(III).5.3(4).4.	Q 3.42 di 21.80 or 7.78 hy 8.68 ab 24.63 mt 1.16 an 26.97 il 3.95	Relsberg, Blatt Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 23, 1910.	Tholeytic diabase.	
173	II(III).5.3.(3)4.	or 15.01 di 13.03 ab 22.53 ol 17.98 an 25.58 mt 2.09 ne 1.42 il 1.37	Hutberg, Neurode, Silesia.	O. Hauser.	F. Tannhäuser, Sb. Pr. Ak. W., 1908, II, p. 1074.	Spessartite.	
174	"II.5."3.4.	Q 5.52 di 2.87 or 17.24 hy 6.46 ab 35.63 mt 7.66 an 21.13 ap 1.34	Reimswaldau, Sudetische Mulde, Bohemia.	Böhm.	G. Berg, Jb. Pr. G. L.-A., XXVIII (1907), p. 239, 1910.	Melaphyre.	
175	II.5.3.(3)4.	or 16.68 di 9.72 ab 20.44 ol 4.13 an 26.69 mt 5.34 ne 3.41 il 3.34 hm 4.00 ap 3.70	Birkigt, Dobrankathal, Bohemia.	R. Pfohl.	J. E. Hibsich, T. M. P. M., XIV, p. 109, 1894.	Nephelite- tephrite.	In W. T., p. 283.
176	II''5.(2)3.4.	Q 5.94 di 9.52 or 11.68 hy 11.98 ab 33.54 mt 5.34 an 14.73 il 3.85 ap 2.85	Niedzwiedzia Gora, n. Cracow, Galicia.	Z. Rozen.	Z. Rozen, B. Ac. Sci. Crac., 1909, p. 301.	Hypersthene diabase.	
177	II.(4)5.3.4.	Q 8.88 di 2.22 or 13.90 hy 8.85 ab 34.58 mt 7.19 an 20.85 il 0.61 ap 0.34	Cziklovabanya, Krasso-Szőreny, Hungary.	K. Emszt.	Rozlozsnit and Emszt, Mt. Ung. G. A., XVI, p. 196, 1908.	Syenite- diorite.	
178	II''5.3.4.	or 9.45 di 13.93 ab 34.06 hy 8.17 an 21.68 ol 2.22 mt 6.73 il 1.06 ap 0.34	Oravicabanya, Krasso-Szőreny, Hungary.	K. Emszt.	Rozlozsnit and Emszt, Mt. Ung. G. A., XVI, p. 193, 1908.	Gabbro- diorite.	
179	"II."5.3.4.	Q 6.60 di 12.72 or 11.12 mt 3.02 ab 38.25 il 0.46 an 25.85 ap 0.67 C 0.20	Pöllgraben, Salzkammergut, Tyrol.	C. v. John.	C. v. John, Jb. G. R.-A., Wien, XLIX, p. 250, 1899.	Tonalite.	In W. T., p. 283.
180	II(III).5.3.4.	or 7.78 di 6.36 ab 28.82 hy 7.82 an 23.81 ol 6.28 mt 10.67 il 3.04 ap 1.34	Steinberg, Salzkammergut, Tyrol.	C. v. John.	C. v. John, Jb. G. R.-A., Wien, XLIX, p. 252, 1899.	Gabbro.	In W. T., p. 283.
181	II''5.3''(3)4.	or 15.57 di 3.19 ab 24.63 hy 19.88 an 27.24 ol 1.00 mt 4.87 ap 2.69	Weissbachtal, Ultental, Tyrol.	C. v. John.	W. Hammer, Jb. G. R.-A., Wien, LIII, p. 83, 1904.	Kersantite.	
182	II.5.3.(3)4.	or 18.35 di 9.98 ab 30.39 hy 1.33 an 21.41 ol 6.32 mt 6.73 il 2.28 ap 1.68	Traversella Thal, Monzoni, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak., 1904, p. 64.	Kersantite.	
183	II(III).5''3.4.	or 12.79 di 19.34 ab 23.06 ol 6.46 an 23.91 mt 6.73 ne 3.98 il 2.28 ap 0.67	Riccoletta, Monzoni, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak., 1904, p. 61.	Olivine monzonite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
184	59.65	17.14	1.24	2.17	4.41	5.51	4.43	3.04	0.94	0.17	1.04				99.74	2.83
A3. III	.994	.168	.008	.031	.110	.098	.071	.032			.013					
185	53.96	15.90	1.58	5.56	7.63	6.31	2.99	2.07	3.46	0.17	0.60				100.23	2.87
A3. III	.899	.156	.010	.077	.191	.113	.048	.022			.008					
186	51.43	15.08	4.29	3.92	8.05	7.12	2.98	2.64	3.68	0.25	0.82				100.26	2.90
A3. III	.857	.148	.027	.054	.201	.127	.048	.028			.010					
187	48.02	20.26	3.49	2.76	7.23	8.87	3.88	1.85	1.82	0.17	1.54				99.83	2.95
A3. III	.800	.198	.022	.039	.181	.159	.063	.020			.019					
188	58.25	19.30	0.70	3.29	3.88	3.87	4.15	3.22	2.21	0.05	1.29				100.21	2.75
A3. III	.971	.189	.004	.046	.097	.070	.067	.034			.016					
189	55.15	15.82	0.43	6.64	4.36	6.53	3.75	2.56	3.36	0.09	1.14				99.83	2.82
A3. III	.919	.155	.003	.092	.109	.116	.061	.028			.014					
190	55.01	20.57	1.75	2.92	3.45	6.35	3.68	1.87	2.50	none	1.73				99.63	2.88
A3. III	.917	.202	.011	.040	.086	.114	.060	.020			.022					
191	51.54	15.99	2.87	6.89	6.53	5.84	3.36	1.50	4.11	0.14	1.05				99.82	2.859
A3. III	.859	.157	.018	.096	.163	.104	.054	.016			.013					
192	48.74	17.80	6.21	4.30	5.30	7.36	2.87	2.03	3.76	0.27	1.44				100.08	2.94
A3. III	.812	.174	.039	.060	.133	.131	.047	.021			.018					
193	58.25	18.54	0.92	4.00	2.01	5.38	4.10	3.58	1.55	0.11	0.96				99.00	2.83
B3. IV	.971	.182	.006	.056	.050	.096	.066	.038			.012					
194	49.54	16.89	2.42	6.43	7.58	7.92	3.58	1.42	2.25	0.05	1.73				99.81	2.96
A3. III	.826	.166	.015	.089	.190	.141	.058	.015			.022					
195	54.55	16.87	6.61	1.43	2.47	6.95	4.85	2.28	1.41	0.25	1.98	0.38			100.03	2.85
A2. II	.909	.165	.041	.019	.062	.124	.078	.024			.025	.003				
196	58.00	18.87	4.81	1.01	3.84	7.92	3.50	2.40	0.60						100.95	2.96
B3. IV	.967	.185	.030	.014	.096	.141	.056	.025								
197	50.70	16.85	1.22	7.95	6.78	9.57	3.27	1.13	0.48	0.19	1.76				99.90	2.98
A3. III	.845	.165	.008	.111	.170	.171	.053	.012			.022					
198	54.57	15.29	4.01	4.01	6.05	5.44	4.16	2.33	3.20	0.42	1.05				100.53	2.80
A3. III	.910	.150	.025	.056	.151	.097	.067	.024			.013					
199	51.30	19.05	3.17	6.49	5.47	8.04	4.01	1.22	1.13	0.18	0.35				100.41	
A3. III	.855	.187	.020	.092	.137	.144	.065	.013			.004					
200	56.82	16.68	3.84	4.57	3.93	6.36	3.39	2.81	1.48			trace		Cl trace	99.88	2.657
A3. III	.947	.163	.024	.064	.098	.113	.055	.030				—				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
184	II."5.(2)3."4.	Q 5.58 di 7.23 or 17.79 hy 8.92 ab 37.20 mt 1.86 an 18.07 il 1.98	Ponteglia Glacier, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Basic por- tion of dike.	Cf. No. 287, I.4.2.3.
185	II(III).5.3."4.	Q 1.80 di 5.99 or 12.23 hy 24.03 ab 25.15 mt 2.32 an 23.91 il 1.22	Piz Avat, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Spessartite.	Fresh?
186	II.5.3.(3).4.	or 15.57 di 12.01 ab 25.15 hy 13.45 an 20.02 mt 6.25 il 1.52	Piz Tgietschen, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Augite porphyrite.	Fresh?
187	II.5"3.4.	or 11.12 di 9.50 ab 23.01 ol 9.59 an 31.97 mt 4.64 ne 5.96 il 2.89 hm 0.32	Piz Tumbif, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Gabbro diorite.	
188	"II."5."3."4.	Q 6.12 hy 13.13 or 18.90 mt 0.93 ab 35.11 il 2.43 an 19.46 C 1.84	Griankopf, Lower Engadine, Switzerland.	L. Hezner?	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 185, 1909.	Hornblende vogesite.	
189	II.5."3."4.	Q 1.14 di 11.44 or 15.57 hy 15.16 ab 31.96 mt 0.70 an 18.35 il 2.13	Griankopf, Lower Engadine, Switzerland.	L. Hezner?	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 183, 1909.	Labradorite porphyrite.	
190	"II."5.3"4.	Q 6.96 hy 9.52 or 11.12 mt 2.55 ab 31.44 il 3.34 an 31.69 C 0.82	Craist Alta, Lower Engadine, Switzerland.	L. Hezner?	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 182, 1909.	Labradorite porphyrite.	
191	II"5.3.4.	Q 1.20 di 3.83 or 8.90 hy 23.02 ab 28.30 mt 4.18 an 24.19 il 1.98	Ardez, Lower Engadine, Switzerland.	M. Dittrich.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 239, 1909.	Hornblende diabase.	
192	II.5.3(4).4.	Q 1.86 di 5.40 or 11.68 hy 11.20 ab 24.63 mt 9.05 an 29.47 il 2.74	Vulpera, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Ecl. G. Helv., VIII, p. 205, 1903.	Gabbro.	
193	"II.5.3.(3)4.	Q 5.10 di 4.15 or 21.13 hy 7.96 ab 34.58 mt 1.39 an 21.68 il 1.82	Val Roseg, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Monzonite.	
194	II"5.3.4.	or 8.34 di 10.69 ab 30.39 hy 1.63 an 25.85 ol 13.54 mt 3.48 il 3.34	Platzers, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Gabbro- diorite.	
195	II.5.(2)3.4.	Q 8.48 di 9.72 or 13.34 hy 1.70 ab 40.87 il 2.89 an 17.51 hm 6.61 tn 1.18 ap 1.00	Maasplankstock, Aarmassif, Switzerland.	O. Fischer.	O. Fischer, T. M. P. M., XXIV, p. 104, 1905.	Augite porphyrite.	
196	II.(4)5.3.4.	Q 8.40 di 7.99 or 13.90 hy 5.90 ab 29.34 mt 3.25 an 28.91 hm 2.56	Val Ufñr, St. Gotthard, Switzerland.	Grubenmann and Ander- wert.	U. Grubenmann, Mt. Thurg. Nf. Ges., X, p. 120, 1892.	Diorite.	In W. T., p. 283.
197	II(III).5.3(4).4"	or 6.67 di 16.08 ab 27.77 hy 5.08 an 27.80 ol 10.74 mt 1.86 il 3.34	Tremola, St. Gotthard, Switzerland.	P. Waindziok.	P. Waindziok, In. Diss. Zür., p. 41, 1906.	Kersantite.	
198	II.5.(2)3.4.	Q 2.34 di 8.34 or 13.34 hy 13.55 ab 35.11 mt 5.80 an 16.40 il 1.98	Berglihorn, Verrucano, Switzerland.	L. Hezner.	R. Beder, In. Diss. Zür., p. 23, 1909.	Augite porphyrite.	
199	II.5.3"4"	or 7.23 di 7.94 ab 34.06 hy 3.09 an 30.30 ol 11.44 mt 4.64 il 0.61	Val Scala, Valtellina, Lombardy.	O. Hecker.	O. Hecker, N. J. B. B., XVII, p. 346, 1903.	Diorite- gabbro.	
200	II."5.3.(3)4.	Q 6.48 di 7.88 or 16.68 hy 11.26 ab 28.82 mt 5.57 an 21.68	Monte Scopa, Capraia Island, Italy.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 141, 1893.	Andesite.	In W. T., p. 283.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
201	53.73	17.00	3.81	3.25	6.24	7.65	3.30	2.45	2.61						100.04	2.64
A3. III	.894	.167	.024	.045	.156	.137	.053	.027								
202	52.46	17.84	2.39	7.11	5.64	9.06	3.81	1.11	1.22		0.29	0.16			101.09	
B2. III	.874	.175	.015	.099	.141	.162	.061	.012			.004	.001				
203	50.30	19.82	5.46	2.91	3.73	9.66	3.75	1.99	0.12		1.99	0.15	0.12		100.00	
A2. II	.838	.194	.034	.040	.093	.172	.061	.021			.025	.001	.002			
204	49.25	17.47	3.33	6.77	3.75	11.09	4.45	1.42	0.18		1.74	0.81			100.26	
A2. II	.821	.171	.021	.094	.094	.198	.072	.015			.022	.006				
205	54.82	20.80	2.40	4.66	3.22	5.02	4.82	2.90	0.85		1.07				100.56	
A3. III	.914	.204	.015	.065	.081	.089	.077	.031			.013					
206	52.79	16.45	2.74	6.44	5.56	6.51	3.64	1.21	1.02	0.21	2.64	0.39	0.06	NiO 0.18	99.84	
A2. II	.880	.161	.017	.089	.139	.116	.059	.013			.033	.003	—			
207	48.97	16.37	1.33	8.56	6.22	7.49	4.09	1.72	0.38	0.08	3.95	1.04	0.06	NiO 0.08	100.34	
A2. II	.816	.160	.008	.119	.156	.134	.066	.018			.049	.007	.001			
208	62.37	18.10	0.48	3.15	3.28	4.94	4.32	3.10	0.32						100.06	
A3. III	1.040	.177	.003	.044	.082	.088	.069	.033								
209	52.20	14.67	1.83	11.51	3.48	6.69	3.04	2.49	0.11		2.55	0.83	trace	Cl S 0.08 0.23	100.23	
A2. II	.870	.144	.011	.160	.087	.120	.049	.026			.031	.006	—			
210	52.27	16.07	2.25	14.48	1.68	6.67	3.29	1.50	2.05						100.26	
A3. III	.871	.157	.014	.201	.042	.120	.053	.016								
211	52.76	20.28	5.87	1.49	4.26	7.08	3.94	3.47	1.06	0.32					100.53	
A3. III	.879	.199	.037	.021	.107	.127	.064	.037								
212	52.14	19.71	6.12	1.50	3.99	7.89	4.64	3.00	0.67	0.15					99.81	
A3. III	.869	.193	.038	.021	.100	.141	.075	.032								
213	53.61	16.11	3.05	4.45	6.80	7.00	3.95	3.08	1.65		0.34		0.14		100.18	2.75
A2. II	.894	.158	.019	.062	.170	.125	.064	.033			.004		.002			
214	52.40	19.27	4.56	3.57	2.03	6.68	5.50	2.03	1.82		1.60	0.52	trace	S 0.10	100.12	2.798
A2. II	.873	.189	.029	.050	.051	.120	.089	.021			.020	.004	—			
215	51.78	18.68	6.42	2.77	1.86	6.04	5.53	2.34	2.78		1.05	0.71		S 0.04	100.00	2.698
A2. II	.863	.183	.040	.039	.047	.108	.089	.024			.013	.005				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
201	II.5.3."4.	Q 0.78 di 10.99 or 15.01 hy 13.18 ab 27.77 mt 5.57 an 24.19	Piano Cigliano, Monte Cimino, n. Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Oligoclaseite (ciminite).	
202	II''5.3''4''.	or 6.67 di 12.98 ab 31.96 hy 8.03 an 23.36 ol 7.50 mt 3.48 il 0.61 ap 0.34	Santo Pablo, Ustica Island, Aeolian Islands.	M. Stark.	M. Stark, T. M. P. M., XXIII, p. 512, 1904.	Basalt.	
203	II.5."3.4.	or 11.68 di 12.31 ab 30.65 ol 2.52 an 31.14 mt 3.94 ne 0.71 il 2.72 hm 3.94 ap 0.34	Eruption of 1911, Mount Etna, Sicily.	G. Ponte.	G. Ponte, Rend. Ac. Linc., XXI (2), p. 215, 1912.	Basalt ash.	3 decimals.
204	II(III).5''3.4''.	or 8.34 di 21.36 ab 26.72 ol 4.15 an 23.35 mt 4.87 ne 5.96 il 3.34 ap 2.02	Valle del Petrolo, Mount Etna, Sicily.	S. di Franco.	S. di Franco, Att. Ac. Gioen., (5). V, Mem. 21, p. 5, 1912.	Basalt.	
205	''II.5.3.4.	or 17.24 di 6.38 ab 40.35 ol 4.81 an 24.74 mt 3.48 C 0.71 il 1.98	Tempio Pausania, Sardinia.	C. Riva.	C. Riva, Att. Ac. Sci. Nap., (2), XII, No. 9, p. 27, 1905.	Segregation in granite.	Cf. No. 317, I.4.2.3.
206	II''5.3.4''.	Q 4.50 di 3.80 or 7.23 hy 17.22 ab 30.92 mt 3.02 an 24.74 il 5.02 ap 1.00	Uras, Monte Arci, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVI, p. 589, 1913.	Basalt.	
207	II''5.3.4	or 10.01 di 7.91 ab 34.58 ol 14.44 an 21.13 mt 1.86 il 7.45 ap 2.35	Graham Island, (1831), Near Sicily.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXVII, p. 138, 1909.	Basalt.	
208	''II.(4)5."3."4.	Q 8.52 di 2.94 or 18.35 hy 12.18 ab 36.15 mt 0.70 an 20.85	Tschcheri, Kasbek, Caucasus.	Not stated.	L.-Lessing and Sewastjanow, Mat. G. Rus., XXI, p. 107, 1901.	Andesite- dacite.	
209	II(III).5.3.(3)4.	Q 2.76 di 7.24 or 14.46 hy 20.63 ab 25.08 mt 2.55 an 19.18 il 4.71 ap 2.02	Goroshki, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, Ref. N. J., 1899, I, p. 463.	Gabbro- syenite.	In W. T., p. 283.
210	II(III).5.3.4.	Q 1.20 di 7.74 or 8.90 hy 24.85 ab 27.77 mt 3.25 an 24.46	Assa, Caucasus.	Krikmeyer.	Loewinson-Lessing, Ref. N. J., 1899, II, p. 234.	Albite diomite.	In W. T., p. 283.
211	II.5.3.(3)4.	or 20.57 di 6.26 ab 30.92 ol 5.46 an 27.24 mt 4.87 ne 1.42 hm 2.56	Lake Karagol, Karabagh, Armenia.	(?)	A. S. Ginsberg, An. Inst. Polyt. St. Pet., XX, p. 52, 1913.	Shoshonite.	
212	II.5''3.4.	or 17.79 di 11.88 ab 29.08 ol 3.15 an 23.91 mt 4.87 ne 5.54 hm 2.72	Near Gerussy, Karabagh, Armenia.	(?)	A. S. Ginsberg, An. Inst. Polyt. St. Pet., XX, p. 51, 1913.	Shoshonite.	
213	II.5.(2)3."4.	or 18.35 di 14.20 ab 31.96 ol 11.01 an 16.96 mt 4.41 ne 0.85 il 0.61	Persufi, Thessaly, Greece.	R. Lepsius.	R. Lepsius, Geol. Attika, p. 169, 1883.	Basalt.	In W. T., p. 283.
214	II.5."3.4.	or 11.68 di 6.08 ab 45.06 ol 1.68 an 21.96 mt 6.73 ne 0.85 il 3.04 ap 1.34	Achada, n. Porto da Cruz Madeira Island.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Trachy- dolerite.	
215	II.5.(2)3.4.	or 13.34 di 8.21 ab 41.92 ol 0.63 an 19.46 mt 6.03 ne 2.56 il 1.98 hm 2.24 ap 1.68	Ilheo, n. Porto do Cruz, Madeira Island.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Trachy- dolerite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
216	47.70	17.32	5.43	4.71	3.62	7.98	4.21	2.45	3.08		2.54	0.99		S 0.04	100.05	2.673
A2. II	.795	.170	.034	.065	.091	.143	.068	.026			.032	.007				
217	46.08	17.39	10.95	2.56	2.66	8.87	3.72	1.38	2.37		2.73	1.11		S 0.02	99.84	2.809
A2. II	.768	.170	.069	.036	.067	.159	.060	.015			.034	.008				
218	51.59	18.90	4.61	6.10	3.20	7.23	3.81	2.33	1.36		1.03	0.36			100.52	
A2. II	.860	.185	.029	.085	.080	.129	.061	.024			.013	.003				
219	53.50	15.20	5.40	6.93	4.95	5.60	4.35	0.95	0.50		2.25	0.09			99.72	
A2. II	.892	.149	.034	.096	.124	.100	.070	.010			.028	.001				
220	48.88	20.56	3.34	5.29	3.09	8.34	4.75	2.56	0.32		1.69	0.73			99.55	
A2. II	.815	.202	.021	.074	.077	.149	.077	.028			.021	.005				
221	48.40	21.47	0.65	2.12	2.65	8.21	5.67	1.45	2.68		2.00	0.36		FeS ₂ 3.78	99.44	
A? 2. II	.807	.210	.004	.029	.066	.146	.092	.016			.025	.003			(99.94)	
222	46.76	14.80	8.71	8.32	1.70	9.46	2.75	2.48	1.45	0.19	2.05	0.63	0.34	SO ₂ 0.35	99.99	
A2. II	.779	.145	.054	.115	.043	.169	.045	.027			.026	.004	.005			
223	53.87	15.25	3.95	5.16	6.16	5.67	3.59	2.53	1.92		1.53	0.32	0.13	CO ₂ 0.52	100.60	
A2. II	.898	.150	.025	.072	.154	.101	.058	.027			.019	.002	.002			
224	58.3	18.0	4.5	2.0	2.3	5.5	5.4	1.7			1.0				100.5	
B3. IV	.972	.176	.028	.028	.058	.098	.087	.018			.013					
225	51.97	16.21	3.37	9.51	3.68	7.67	3.41	1.75	1.97		0.22				99.76	
A3. III	.866	.159	.021	.132	.092	.138	.055	.019			.003					
226	57.51	15.88	3.50	3.71	4.48	9.16	3.70	1.27	1.21		trace	0.29	0.17		100.88	
A3. III	.959	.156	.022	.051	.112	.164	.060	.014			—	.002	.002			
227	56.82	18.85	5.05	2.90	2.76	5.45	4.80	2.07	1.62		trace	0.38	0.16		100.86	
A3. III	.947	.185	.032	.040	.069	.097	.077	.022			—	.003	.002			
228	54.21	15.11	3.94	5.25	6.42	8.19	3.96	1.91	1.28		0.52	0.14			100.93	
B2. III	.904	.148	.025	.073	.161	.146	.064	.020			.007	.001				
229	54.18	15.33	5.65	6.30	3.28	7.77	3.96	2.32	0.47		0.76	0.72			100.74	
A2. II	.903	.150	.036	.088	.082	.139	.064	.024			.010	.005				
230	51.02	17.81	3.75	6.17	5.30	8.98	3.81	1.01	1.48		0.72	0.72	0.18		100.95	
B2. III	.850	.175	.024	.086	.133	.161	.061	.011			.009	.005	.003			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
216	II.5.3.4.⊙	or 14.46 di 9.50 ab 31.44 ol 3.29 an 21.13 mt 7.66 ne 2.27 il 4.86 hm 0.16 ap 2.35	Ribeiro Frio, Madeira Island.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Trachy- dolerite.	
217	II.5.3.4.⊙	Q 1.44 di 7.99 or 8.34 hy 3.00 ab 31.44 mt 0.46 an 26.41 il 5.17 hm 10.72 ap 2.69	Pico Serrado, Madeira Island.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Trachy- dolerite.	Iron oxides?
218	II.5.3.4.⊙	Q 0.48 di 4.32 or 13.34 hy 11.55 ab 31.96 mt 6.73 an 27.80 il 1.38 ap 1.01	Sao Vicente, Cape Verde Islands.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 655, 1912.	Basalt.	
219	II''5.3.4(5).	Q 5.28 di 6.24 or 5.56 hy 13.90 ab 36.68 mt 7.89 an 19.18 il 4.26 ap 0.34	Grotto Mountain, Mony, Ivory Coast.	Pisani.	A. Lacroix, Nouv. Arch. Mus., III, p. 118, 1911.	Norite.	
220	II.5(6).3.4.	or 15.57 di 7.88 ab 25.15 ol 5.88 an 26.97 mt 4.87 ne 8.24 il 3.19 ap 1.68	Topsail Point, Tamara Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, Nouv. Arch. Mus., III, p. 80, 1911.	Topsallite (mica- basalt).	
221	II.5(6).3.4(5).	or 8.90 di 7.34 ab 31.44 ol 2.24 an 28.36 mt 0.95 ne 9.09 il 3.80 ap 1.01 pr 3.78	Topsail Point, Tamara Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, Nouv. Arch. Mus., III, p. 78, 1911.	Micromon- zonite.	Inclusion in nephelite syenite. Sum?
222	II(III).5.3.(3)4.	Q 2.10 di 19.21 or 15.01 mt 12.53 ab 23.58 il 3.95 an 20.29 ap 1.34	Mont Caffé, Sao Thomé Island, Guinea Coast.	A. Lindner.	W. Boese, N. J. B. B., XXXIV, p. 273, 1912.	Basalt.	Three decimals.
223	II''5.3''4.	Q 2.70 di 6.42 or 15.01 hy 16.30 ab 30.39 mt 5.80 an 18.07 il 2.89 ap 0.67	Mount Duli, Adamawa, Kamerun.	M. Dittrich.	W. Edlinger, In. Diss. Erl., p. 64, 1908.	Diorite.	
224	''II''5.(2)3.4''.	Q 6.90 di 5.83 or 10.01 hy 3.10 ab 45.59 mt 3.48 an 19.74 il 1.98 hm 2.08	Gebel Doukhan, Egypt.	Not stated.	J. Couyat, C. R., CXLVII, p. 868, 1908.	Microdiorite.	
225	II(III).5.3.4.	or 10.56 di 12.31 ab 28.82 hy 17.29 an 23.63 mt 4.87 il 0.46	Delen, Kordofan.	Sprockhoff.	G. Linck, N. J. B. B., XVII, p. 428, 1903.	Diorite porphyry.	
226	II.(4)5.3.4.	Q 7.98 di 16.71 or 7.78 hy 7.28 ab 31.44 mt 5.10 an 22.80 ap 0.67	Galaba Well, Molebso, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 76, 1909.	Quartz diorite.	
227	''II''5.3.4.	Q 6.12 hy 8.06 or 12.23 mt 7.42 ab 40.35 ap 1.01 an 23.91	Coatit, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 68, 1909.	Quartz diorite.	
228	II(III).5.3.4.	or 11.12 di 16.68 ab 33.54 hy 10.77 an 18.90 ol 1.98 mt 5.80 il 1.06 ap 0.34	Azeo, Digma, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 90, 1909.	Diorite porphyry.	
229	II''5.3''4.	Q 4.02 di 13.60 or 13.34 hy 7.10 ab 33.54 mt 8.35 an 17.24 il 1.52 ap 1.68	Elos, Mai Adarete, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 92, 1909.	Diorite porphyry.	
230	II''5.3''4(5).	or 6.12 di 9.05 ab 31.96 hy 12.26 an 28.63 ol 2.87 mt 5.57 il 1.37 ap 1.68	Brigantia, Cheren, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 82, 1909.	Hornblende diorite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
231	53.39	17.96	2.49	4.91	3.13	6.41	4.37	3.43	0.80	0.39	1.81	0.62			99.71	
A2. II	.890	.176	.016	.068	.078	.114	.071	.036			.023	.004				
232	53.10	21.80	1.15	5.75	3.05	5.84	5.65	2.56	0.62		1.41				100.93	
B3. IV	.885	.214	.007	.080	.076	.104	.091	.028			.018					
233	51.38	16.07	3.93	6.19	4.98	6.34	4.60	2.20	0.69	0.22	2.83	0.78			100.21	
A2. II	.856	.158	.025	.086	.125	.113	.074	.023			.035	.005				
234	48.76	19.57	4.23	4.69	3.06	7.70	3.95	2.69	1.75	0.78	2.36	0.15			99.69	
A2. II	.813	.192	.026	.065	.077	.138	.064	.029			.030	.001				
235	46.62	19.02	5.36	5.12	3.66	8.68	3.78	2.08	1.55	0.85	2.70	0.22			99.64	
A2. II	.777	.186	.034	.071	.092	.155	.061	.022			.034	.002				
236	46.38	16.49	3.29	8.83	5.39	8.97	2.81	2.01	0.80	0.33	3.77	0.75			99.82	
A2. II	.773	.162	.021	.122	.135	.161	.045	.021			.047	.005				
237	51.24	16.39	3.09	6.30	3.55	6.27	3.78	3.17	2.36		3.54	0.16			99.85	
A2. II	.854	.161	.019	.088	.099	.113	.061	.034			.044	.001				
238	47.49	17.11	4.83	6.63	4.95	9.90	2.80	1.77	0.31	0.35	2.83	0.77			99.74	
A2. II	.792	.168	.030	.092	.124	.177	.045	.019			.035	.005				
239	47.04	17.70	2.59	7.56	5.53	9.90	3.05	1.81	1.02	0.17	2.71	0.50		CO ₂ 0.29	99.87	
A2. II	.784	.174	.016	.105	.138	.177	.049	.019			.034	.004			(99.95)	
240	48.47	15.31	6.69	6.36	3.60	8.14	4.49	1.67	1.65		2.23	0.52		CO ₂ 0.26 SO ₃ trace S 0.14	99.53	2.886
A2. II	.808	.150	.042	.089	.090	.145	.073	.018			.028	.004				
241	48.63	17.01	2.92	8.85	3.87	7.90	3.98	1.76	0.22		4.02	0.77			99.93	
A2. II	.811	.164	.018	.123	.097	.141	.065	.019			.050	.005				
242	47.79	19.76	0.93	4.96	5.93	7.57	5.01	1.24	3.34	0.35	1.18	1.44	0.28	CO ₂ trace Cl trace S 0.02 Cr ₂ O ₃ trace BaO none	99.80	2.732
A2. II	.797	.194	.006	.069	.148	.136	.081	.013			.015	.010	.004			
243	54.90	20.23	3.42	5.26	3.11	6.24	4.86	1.44	0.54				0.18		100.18	2.89
A3. III	.915	.198	.021	.073	.078	.112	.078	.015					.003			
244	49.37	17.67	6.28	4.81	5.02	9.12	3.27	1.41	2.15		0.28				99.38	2.522
B3. IV	.823	.173	.039	.067	.126	.163	.053	.015			.004					
245	48.43	15.54	7.95	5.09	6.08	8.13	4.03	1.21	2.07		0.91				99.44	2.758
B3. IV	.807	.152	.050	.071	.152	.145	.065	.013			.011					

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
231	II.5.(2)3."4.	or 20.02 di 7.20 ab 37.20 hy 1.86 an 19.18 ol 4.54 mt 3.71 il 3.50 ap 1.34	Ankify, Madagascar.	Not stated.	A. Lacroix, pers. com.	Monzonite.	
232	"II.5"3.4.	or 15.57 di 2.04 ab 26.46 ol 10.20 an 26.41 mt 1.62 ne 6.96 il 2.74	Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 32, 1902.	Covite.	
233	II.5.(2)3.4.	or 12.79 di 7.75 ab 38.77 hy 5.06 an 16.96 ol 5.14 mt 5.80 il 5.32 ap 1.68	Taniankatsaka, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Basalt.	
234	II.5.3."4.	or 16.12 di 7.91 ab 28.30 ol 3.65 an 27.52 mt 6.03 ne 2.84 il 4.56 ap 0.34	Ambohibaho, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Labradorite (basalt).	
235	II.5.3.4.⊙	or 12.23 di 9.75 ab 26.46 ol 3.56 an 28.63 hy 7.89 ne 2.98 il 5.17 ap 0.67	Ambodinapahitra, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Labradorite (basalt).	
236	II(III).5.3"."4.	or 11.68 di 10.82 ab 23.58 hy 4.05 an 26.69 ol 8.21 mt 4.87 il 7.14 ap 1.68	Mont Inanobé, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Basalt.	
237	II.5.(2)3.(3)4.	or 18.90 di 9.79 ab 31.96 hy 5.12 an 18.35 ol 2.43 mt 4.41 il 6.69 ap 0.34	Madagascar.	Not stated.	A. Lacroix, pers. com.	Akerite.	
238	II(III).5.3(4).4.	or 10.56 di 12.42 ab 23.58 hy 8.55 an 28.91 ol 1.08 mt 6.96 il 5.32 ap 1.68	Ivong, Madagascar.	Not stated.	A. Lacroix, pers. com.	Hypersthene gabbro.	
239	II(III).5.3(4).4.	or 10.56 di 13.04 ab 23.06 ol 10.70 an 29.47 mt 3.71 ne 1.42 il 5.17 ap 1.34	Mana Kanala, Madagascar.	Boiteau.	A. Lacroix, pers. com.	Basalt.	
240	II(III).5.(2)3.4.	or 10.01 di 16.19 ab 35.63 ol 2.71 an 16.40 mt 9.74 ne 1.42 il 4.26 ap 1.34	Oldonyo Sambu, German East Africa.	A. Eyme.	L. Finckh, Z. D. G. G., LXV, p. 501, 1913.	Basaltic trachy- dolerite.	
241	II"5.3.4.	or 10.56 di 10.01 ab 34.06 hy 1.10 an 23.24 ol 8.01 mt 4.18 il 7.60 ap 1.68	Avirons, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 541, 1912.	Basalt.	
242	II.5"3.4(5).	or 7.23 di 0.68 ab 33.01 ol 15.42 an 27.80 mt 1.39 ne 5.11 il 2.28 ap 3.36	Kugensk, Jenisei District, Siberia.	M. Dittrich.	J. Rakovsky, Trav. Mus. G. Pet. Grt., V, p. 237, 1911.	Essexite- diabase.	
243	II.5.3.4".	Q 0.42 di 1.61 or 8.34 hy 14.25 ab 40.87 mt 4.87 an 29.19	Choa-schen Volcano, Kamchatka.	Not stated.	K. Bogdanovitch, Pet. Mt., L, p. 99, 1904.	Andesite.	
244	II"5.3(4).4.	or 8.34 di 12.85 ab 27.77 hy 8.78 an 29.19 ol 0.90 mt 9.05 il 0.61	Kyry Nor, Manchuria.	Not stated.	P. Venukoff, B. Soc. Belg. G., II, p. 446, 1888.	Trachylite.	Not in W. T.
245	II(III).5.3.4".	or 7.23 di 15.47 ab 34.06 hy 0.73 an 20.57 ol 6.04 mt 11.60 il 1.67	Abtzhikh, Kairkhan Mountains, Manchuria.	Not stated.	P. Venukoff, B. Soc. Belg. G., II, p. 446, 1888.	Basalt.	Not in W. T.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
246	48.82	14.10	2.75	8.73	4.25	5.50	4.00	1.76	4.50		5.12				99.53	
A3. III	.814	.138	.017	.121	.106	.098	.065	.019			.064					
247	52.40	17.59	3.51	7.07	3.73	9.36	2.93	1.77	0.57		1.06	0.14	0.16		100.29	
A2. II	.873	.172	.022	.099	.093	.167	.047	.019			.013	.001	.002			
248	49.29	18.49	2.38	6.77	6.09	8.14	3.93	1.79	0.88		2.22	trace	0.22		100.20	
A2. II	.822	.181	.015	.094	.152	.145	.063	.019			.023	—	.003			
249	53.91	15.65	3.75	2.82	4.81	7.09	4.12	2.47	2.05		2.00	1.28	trace		99.95	
A2. II	.899	.153	.024	.039	.120	.127	.066	.027			.025	.009	—			
250	52.19	19.74	4.72	6.28	2.24	6.99	3.48	2.04	1.25				0.06		98.99	
B?3. IV?	.870	.194	.029	.088	.056	.125	.056	.021					.001		(99.99)	
251	48.33	16.29	3.24	8.73	5.70	8.50	3.59	1.49	0.82		2.40	0.79	0.11		99.99	2.562
A2. II	.806	.160	.020	.121	.143	.152	.058	.016			.030	.006	.002			
252	55.7	19.5	6.8	0.8	3.7	8.2	3.8	1.9	0.2						100.6	2.689
B3. IV	.928	.191	.043	.011	.093	.146	.061	.020								
253	54.9	19.2	4.9	3.4	2.6	9.2	4.0	1.8	0.8						100.8	
B3. IV	.902	.188	.031	.047	.065	.164	.065	.019								
254	53.75	17.06	4.18	5.50	4.07	7.72	3.33	1.37	0.50	0.39	0.88	0.25	0.50	ZrO ₂ none Cl 0.11 F 0.06 S 0.06 BaO 0.02 SrO 0.12	99.87	
A1. I	.896	.167	.026	.076	.102	.138	.053	.015			.011	.002	.007			
255	53.2	19.2	4.0	2.9	3.7	9.2	5.5	1.9	0.4						100.0	
B3. IV	.887	.188	.025	.040	.093	.164	.089	.020								
256	53.01	18.49	3.90	5.37	4.24	7.28	4.63	1.98	1.16				0.27		100.33	2.799
A? III	.884	.181	.024	.075	.106	.130	.074	.021					.004			
257	55.06	17.92	4.39	5.24	3.26	8.29	3.09	2.01	0.07	0.23	0.36		0.50		100.42	2.61
A2. II	.918	.176	.028	.073	.082	.148	.050	.021			.005		.007			
258	52.89	18.93	4.06	4.80	3.72	8.56	3.98	0.94	0.58	0.84	0.96	0.22	0.43	CO ₂ 0.10 SO ₂ none Cl trace S 0.04	101.05	2.772
B2. III	.882	.186	.026	.067	.093	.153	.065	.010			.012	.002	.006			
259	53.74	18.26	6.21	3.00	2.69	8.06	3.58	2.52	0.60	0.16	0.97	0.33	0.08		100.19	2.67
A2. II	.896	.179	.039	.042	.067	.144	.058	.027			.012	.002	.001			
260	57.66	21.17	0.05	5.11	1.70	6.57	3.81	1.73	1.00	0.05	0.88	trace	0.11	CO ₂ 0.11 ZrO ₂ none Cl trace S 0.05 Cr ₂ O ₃ none NiO 0.04 BaO none SrO none Li ₂ O none	100.04	2.78
A1. I	.961	.208	—	.071	.043	.118	.061	.018			.011	—	.002			
261	56.52	17.55	3.14	4.86	2.51	5.50	4.82	1.90	2.45	0.25	trace	0.22	0.13		99.85	2.75
A2. II	.942	.172	.020	.068	.063	.098	.077	.020			—	.002	.002			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
246	II(III).5.(2)3.4.	Q 0.48 di 10.79 or 10.56 hy 10.66 ab 34.06 mt 3.94 an 15.01 il 9.73	Liou-chou-ko, East Yunnan, China.	Pisani.	J. Deprat, Mem. Ser. G. Indo-Ch., I (1), p. 234, 1912.	Basalt.	Fresh?
247	II''5.3(4).4.	Q 2.88 di 13.30 or 10.56 hy 11.44 ab 24.63 mt 5.10 an 29.47 il 1.98 ap 0.34	Uso Volcano, Hokkaido, Japan.	Sakaonura.	D. Sato, Jap. G. S. B., XXIII, 1913.	Andesite.	Cited in Zs. Vulk., I, p. 281, 1915.
248	II.5.3.4.⊙	or 10.56 di 10.30 ab 27.77 ol 12.51 an 27.52 mt 3.48 ne 2.84 il 4.26	Genbudo, Tajima, Japan.	C. Sugiura.	S. Kozu, pers. com.	Basalt.	
249	II.5.''3.4.	Q 3.84 di 7.99 or 15.01 hy 8.30 ab 34.58 mt 3.25 an 16.68 il 3.80 hm 1.60 ap 3.02	Otsurumizu, Bungo, Kiu Shiu, Japan.	K. Yokoyama.	S. Kozu, Sc. Rep. Toh. Un., I, p. 78, 1913.	Trachy- andesite.	
250	II.5.3(4).4.	Q 3.00 di 1.86 or 11.68 hy 12.59 ab 29.34 mt 6.73 an 32.53	Madara Shina, Hizen, Japan.	T. Ono.	S. Kozu, J. G., XIX, p. 574, 1911.	Trachy- dolerite.	Sum uncertain.
251	II(III).5.3.4.	or 8.90 di 10.45 ab 30.39 hy 2.89 an 23.91 ol 11.62 mt 4.64 il 4.56 ap 2.02	Ondake Volcano, Fukae, Goto Islands, Japan.	K. Yokoyama.	S. Kozu, J. G., XIX, p. 574, 1911.	Trachy- dolerite.	
252	II.''5.3''4.	Q 5.58 di 7.78 or 11.12 hy 5.70 ab 31.96 mt 2.55 an 30.58 hm 5.12	Kaba Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 57, 1903.	Pyroxene andesite.	
253	II.5.3.4.⊙	Q 2.94 di 13.34 or 10.56 hy 2.23 ab 34.06 mt 7.19 an 28.91	Sago Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 27, 1903.	Andesite.	
254	II.(4)5.3(4).4.	Q 6.60 di 7.23 or 8.34 hy 12.75 ab 27.77 mt 6.03 an 27.52 il 1.67 ap 0.67	Rau Rau, Merapi Volcano, Sumatra.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 625, 1913.	Pyroxene andesite.	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.
255	II.5(6).''3.4''.	or 11.12 di 18.74 ab 32.49 ol 1.71 an 21.96 mt 5.80 ne 7.67	Merapi Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 40, 1903.	Pyroxene andesite.	
256	II.5.3.4.⊙	or 11.68 di 9.98 ab 38.25 ol 9.47 an 23.91 mt 5.57 ne 0.28	Soengei Lassie, Sumatra.	L. Serrurier.	R. D. M. Verbeek, Sum. Westk., p. 232, 1883.	Quartz diorite.	Not in W. T.
257	II.''5.3(4).4.	Q 6.60 di 9.80 or 11.68 hy 9.59 ab 26.20 mt 6.50 an 29.19 il 0.76	Watoe belah, Loh-oelo, Java.	N. Sahlbom.	G. Niethammer, T. M. P. M., XXVIII, p. 227, 1909.	Pyroxene andesite.	
258	II.5.3(4).4(5).	Q 2.82 di 7.88 or 5.56 hy 10.10 ab 34.06 mt 6.03 an 30.86 il 1.82 ap 0.67	Burangerang, Preanger Province, Java.	E. C. J. Mohr.	E. C. J. Mohr, B. Dep. Agr. Ind. Neer., XXVIII, p. 10, 1909.	Andesite.	
259	II.''5.3.''4.	Q 5.28 di 9.29 or 15.01 hy 2.40 ab 30.39 mt 7.19 an 26.13 il 1.82 hm 1.28 ap 0.67	Ndano, Sumbawa Island, Sunda Islands.	A. Lindner.	G. Rack, N. J. B. B., XXXIV, p. 54, 1912.	Andesite.	
260	(I)II.(4)5.3(4).4.	Q 8.76 hy 12.48 or 10.01 ol 1.67 ab 31.96 an 32.80 C 1.12	Noosa Head, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 169, 1906.	Quartz diorite.	
261	II.''5.''3.4.	Q 4.86 di 3.45 or 11.12 hy 11.08 ab 40.35 mt 4.64 an 20.85 ap 0.67	Ottaba, Esk, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Augite. andesite.	H. C. Richards, pers. com.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
262	52.24	16.52	4.52	6.61	3.55	8.20	3.28	1.48	0.65	0.58	1.44	0.80	trace		99.87	2.87
A2. II	.871	.162	.028	.092	.089	.146	.053	.016			.018	.006	—			
263	49.90	15.79	4.52	6.25	5.77	9.12	3.24	6.89	1.36	1.28	1.98	0.43	0.12		100.65	2.76
A2. II	.832	.155	.028	.087	.144	.163	.052	.009			.025	.003	.002			
264	57.64	18.28	2.57	3.68	2.73	6.40	4.08	2.03	1.10	0.28	0.64	0.31	0.25	CO ₂ 0.03 ZrO ₂ none SO ₃ 0.08 Cl 0.02 Cr ₂ O ₃ trace V ₂ O ₅ 0.02 NiO 0.04 BaO 0.09 SrO trace Li ₂ O none	100.27	2.744
A1. I	.961	.179	.016	.051	.068	.114	.066	.022			.008	.002	.003			
265	51.02	16.98	5.52	4.13	4.13	6.37	3.61	2.98	1.95	1.01	1.44	0.30	0.29	CO ₂ 0.35 ZrO ₂ none SO ₃ 0.19 Cl 0.03 F none Cr ₂ O ₃ none V ₂ O ₅ 0.02 NiO 0.04 BaO 0.25 SrO trace Li ₂ O none CuO trace	100.61	2.788
A1. I	.850	.166	.034	.057	.103	.114	.058	.032			.018	.002	.004			
266	54.76	16.49	0.80	10.71	3.57	7.89	2.67	2.03	0.59	0.11		0.32			99.94	
A3. III	.913	.162	.005	.149	.089	.141	.044	.023				.002				
267	53.86	15.41	1.50	11.51	3.60	7.18	3.04	1.24	1.10	0.44	0.36	0.35	0.16	CO ₂ none ZrO ₂ none SO ₃ none Cl 0.06 Cr ₂ O ₃ none V ₂ O ₅ 0.04 NiO none BaO none SrO trace	99.85	2.853
A1. I	.895	.151	.009	.160	.090	.129	.049	.003			.005	.002	.002			
268	53.21	17.84	3.80	5.22	2.96	6.48	3.36	3.03	1.27	0.65	1.01	0.44	0.32	CO ₂ 0.02 ZrO ₂ none SO ₃ 0.09 Cl 0.11 F none Cr ₂ O ₃ none V ₂ O ₅ 0.01 NiO 0.04 BaO 0.02 SrO trace Li ₂ O trace CuO trace	99.88	2.768
A1. I	.887	.175	.024	.072	.074	.116	.055	.032			.013	.003	.004			
269	51.16	19.16	3.98	4.64	3.73	6.80	4.05	2.89	1.48	0.72	0.84	0.56	0.26	CO ₂ 0.03 ZrO ₂ none SO ₃ 0.06 Cl 0.04 F trace Cr ₂ O ₃ none V ₂ O ₅ 0.05 NiO 0.02 BaO 0.08 SrO trace Li ₂ O none CuO 0.01	100.56	2.760
A1. I	.853	.188	.025	.064	.093	.121	.065	.031			.010	.004	.004			
270	51.11	17.70	3.99	5.13	3.43	6.51	3.97	3.25	2.41	0.52	1.34	0.65	0.32	CO ₂ 0.01 ZrO ₂ none SO ₃ none Cl 0.01 F none Cr ₂ O ₃ trace V ₂ O ₅ 0.05 NiO 0.02 BaO 0.07 SrO trace Li ₂ O trace	100.49	2.788
A1. I	.852	.173	.025	.071	.086	.116	.065	.035			.017	.002	.005			
271	52.86	17.23	4.10	4.59	3.34	7.62	3.29	2.75	1.48	0.91	1.10	0.43	none	CO ₂ 0.04 ZrO ₂ none Cl trace F none S none Cr ₂ O ₃ none V ₂ O ₅ 0.03 NiO none BaO 0.01 SrO trace Li ₂ O trace	99.78	2.757
A1. I	.861	.169	.026	.064	.084	.136	.053	.030			.014	.003	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
262	II."5.3".4.	Q 6.18 di 7.48 or 8.90 hy 11.32 ab 27.77 mt 6.50 an 25.85 il 2.74 ap 2.02	Burleigh Heads, Queensland.	N. H. Christensen.	A. R. Agric. Chem. Qld., 1914.	Andesitic basalt.	H. C. Richards, pers. com.
263	II(III).5.3(4).4(5).	Q 2.34 di 12.12 or 5.00 hy 12.87 ab 27.25 mt 6.50 an 26.13 il 3.80 ap 1.01	Chinghee Creek, Queensland.	A. T. Jefferis.	A. R. Agric. Chem. Qld., 1913.	Basalt.	H. C. Richards, pers. com.
264	"II.(4)5.3.4.	Q 9.00 di 3.56 or 12.23 hy 7.35 ab 34.58 mt 3.71 an 25.30 il 1.22 ap 0.67	Good Dog Mountains, Cambewarra Range, New South Wales.	H. P. White.	Card and Jaquet, Rec. G. S. N. S. W., VII, p. 120, 1902.	Quartz diorite.	
265	II.5.3.(3)4.	Q 1.26 di 6.76 or 17.79 hy 7.80 ab 30.39 mt 7.89 an 21.13 il 2.74 ap 0.67	Nowra, Cambewarra Range, New South Wales.	J. C. H. Min- gaye.	Card and Jaquet, Rec. G. S. N. S. W., VII, p. 127, 1902.	Hornblende lampro- phyre.	
266	II(III).5.3".4.	Q 2.94 di 9.19 or 12.79 hy 23.24 ab 23.06 mt 1.16 an 26.41 ap 0.67	Mother's paddock, Inverell, New South Wales.	Not stated.	A. R. Dep. Min., N. S. W. (1898), p. 187, 1899.	Tachylite.	Not in W. T.
267	II(III)."5.3".4.	Q 4.50 di 8.28 or 3.23 hy 24.33 ab 25.68 mt 2.09 an 24.74 il 0.76 ap 0.67	Inverell, New South Wales.	W. A. Greig.	A. R. Dep. Min. N. S. W. (1912). p. 198, 1913.	Tachylite.	
268	II.5.3.(3)4.	Q 3.72 di 4.08 or 17.79 hy 10.03 ab 28.82 mt 5.57 an 24.46 il 1.98 ap 1.01	Croobyar Creek, Milton, Nowra, New South Wales.	A. H. Greig.	G. W. Card, Rec. G. S. N. S. W., VIII, p. 85, 1905.	Orthoclase basalt.	
269	II.5.3."4.	Q 0.66 di 3.59 or 17.24 hy 11.93 ab 34.06 mt 5.80 an 25.58 il 1.52 ap 1.34	Milton, Nowra, New South Wales.	H. P. White.	G. W. Card, Rec. G. S. N. S. W., VIII, p. 85, 1905.	Orthoclase basalt.	
270	II.5."3.(3)4.	or 19.46 di 5.84 ab 34.06 hy 1.53 an 20.29 ol 6.34 mt 5.80 il 2.58 ap 1.68	Milton, Nowra, New South Wales.	H. P. White.	G. W. Card, Rec. G. S. N. S. W., VIII, p. 83, 1905.	Diorite.	
271	II.5.3.(3)4.	Q 2.58 di 8.93 or 16.68 hy 7.28 ab 27.77 mt 6.03 an 23.91 il 2.13 ap 1.01	Dapto Flow, Calderwood, Camden County, New South Wales.	H. P. White.	G. W. Card, Rec. G. S. N. S. W., VIII, p. 263, 1907.	Dolerite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
272	52.72	16.19	4.80	4.14	4.12	8.10	3.31	2.45	1.56	0.92	1.20	0.48	0.07	CO ₂ 0.07 ZrO ₂ none SO ₃ none Cl trace Cr ₂ O ₃ none V ₂ O ₃ 0.02 NiO trace BaO 0.05 SrO trace	100.20	
A1. I	.879	.159	.030	.057	.103	.145	.053	.027			.015	.003	.001			
273	52.48	17.32	4.30	5.04	3.65	7.66	3.43	2.53	1.61	0.59	0.74	0.42	0.31	CO ₂ 0.17 ZrO ₂ none SO ₃ 0.09 Cl trace Cr ₂ O ₃ trace V ₂ O ₃ 0.03 NiO 0.01 BaO 0.06 SrO trace Li ₂ O none CuO trace	100.44	2.789
A1. I	.875	.170	.027	.069	.091	.124	.055	.027			.009	.003	.004			
274	51.92	15.58	5.00	4.68	4.09	7.72	3.38	2.56	1.35	1.19	1.20	0.54	0.24	CO ₂ 0.02 ZrO ₂ none SO ₃ none Cl 0.05 Cr ₂ O ₃ none V ₂ O ₃ 0.04 NiO 0.02 BaO 0.07 SrO trace Li ₂ O none CuO 0.01	99.66	2.758
A1. I	.865	.153	.031	.065	.102	.138	.055	.028			.015	.004	.003			
275	51.32	18.82	4.50	2.97	3.58	6.42	3.97	3.31	2.89	0.87	0.56	0.42	0.23	CO ₂ 0.10 ZrO ₂ none SO ₃ none Cl trace Cr ₂ O ₃ none V ₂ O ₃ 0.04 NiO 0.01 BaO 0.22 SrO trace Li ₂ O trace CuO 0.02	100.25	2.664
A1. I	.855	.184	.028	.042	.090	.114	.065	.035			.007	.003	.003			
276	51.19	14.03	4.95	6.48	4.27	8.18	3.53	1.10	1.52	1.06	2.72	0.99	0.09	CO ₂ 0.04 ZrO ₂ 0.02 SO ₃ none Cl 0.01 Cr ₂ O ₃ trace V ₂ O ₃ 0.01 BaO 0.04 SrO trace CuO 0.01	100.24	2.814
A1. I	.853	.137	.031	.090	.107	.146	.056	.012			.034	.007	.001			
277	50.24	15.42	5.59	6.75	3.73	7.86	3.60	1.47	1.16	0.89	3.08	0.37	0.12	CO ₂ 0.63 ZrO ₂ none SO ₃ 0.07 Cl 0.01 Cr ₂ O ₃ trace V ₂ O ₃ 0.06 NiO 0.04 BaO 0.03 SrO trace Li ₂ O none CuO 0.01	100.53	2.866
A1. I	.837	.151	.035	.093	.093	.140	.058	.016			.039	.003	.002			
278	50.78	15.16	2.36	10.01	4.43	6.46	3.54	2.20	1.32	0.75	2.60	0.34	0.14	CO ₂ 0.01 ZrO ₂ none SO ₃ 0.15 Cl 0.02 F none Cr ₂ O ₃ none V ₂ O ₃ 0.02 NiO 0.05 BaO 0.05 SrO trace Li ₂ O trace CuO 0.01	100.40	2.795
A1. I	.846	.149	.015	.139	.111	.115	.057	.023			.033	.002	.002			
279	49.80	15.43	4.70	5.39	5.95	9.52	3.01	2.48	2.27	0.39	0.40	0.30	0.17	CO ₂ 0.04 ZrO ₂ trace SO ₃ 0.02 Cl 0.02 S none Cr ₂ O ₃ trace V ₂ O ₃ 0.05 NiO none BaO 0.03 SrO trace Cu trace	99.95	2.857
A1. I	.830	.151	.029	.075	.149	.170	.048	.027			.005	.002	.002			
280	49.56	17.54	1.20	7.83	5.72	8.46	2.73	2.08	1.98	0.40	1.30	0.50	0.22	CO ₂ 0.12 ZrO ₂ none SO ₃ none Cl 0.09 S 0.03 Cr ₂ O ₃ none V ₂ O ₃ 0.01 NiO none BaO 0.03 SrO trace	99.83	2.910
A1. I	.826	.172	.008	.108	.143	.151	.044	.022			.016	.004	.003			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4: DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
272	II.5.3."4.	Q 4.26 di 11.85 or 15.01 hy 6.42 ab 27.77 mt 6.96 an 21.96 fl 2.28 ap 1.34	Dapto Flow, Port Kemble, New South Wales.	H. P. White.	A. R. Dep. Min. N. S. W. (1911), p. 198, 1912.	Dolerite.	
273	II.5.3."4.	Q 3.42 di 5.84 or 15.01 hy 10.63 ab 28.82 mt 6.26 an 24.46 fl 1.37 ap 1.01	Saddleback Flow, Kiama, New South Wales.	H. P. White.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII, p. 16, 1905.	Dolerite.	
274	II.5.3."4.	Q 3.06 di 12.17 or 15.57 hy 6.92 ab 28.82 mt 7.19 an 19.46 fl 2.28 ap 1.35	Blow Hole Flow, Kiama, New South Wales.	J. C. H. Min- gaye.	Jaquet, Card, and White, Rec. G. S. N. S. W., VIII, p. 7, 1905.	Basalt.	
275	II.5.3.(3)4.	or 19.46 di 4.38 ab 34.06 hy 1.73 an 23.35 ol 4.33 mt 6.50 fl 1.06 ap 1.01	Minumurra Flow, Kiama, New South Wales.	H. P. White.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII, p. 21, 1905.	Dolerite.	
276	II(III).(4)5.3.4".	Q 7.26 di 12.20 or 6.67 hy 8.08 ab 29.34 mt 7.19 an 19.18 fl 5.17 ap 2.35	Bong Bong Flow, Kiama, New South Wales.	J. C. H. Min- gaye.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII, p. 23, 1905.	Basalt.	
277	II".5.3.4.	Q 4.44 di 11.74 or 8.90 hy 6.22 ab 30.39 mt 8.12 an 21.41 fl 5.93 ap 1.00	Bong Bong Flow, Kiama, New South Wales.	J. C. H. Min- gaye.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII, p. 23, 1905.	Basalt.	
278	II(III).5.3.4.	or 12.79 di 9.03 ab 29.67 hy 15.68 an 19.18 ol 2.14 mt 3.48 fl 5.02 ap 0.67	Tweed River Heads, New South Wales.	J. C. H. Min- gaye.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 304, 1904.	Basalt.	
279	II(III).5.3.(3)4.	or 15.01 di 19.43 ab 25.15 hy 0.33 an 21.13 ol 7.81 mt 6.73 fl 0.76 ap 0.67	O'Haras Head, Kioloa, New South Wales.	W. A. Greig.	N. S. W. Dep. Min. A. R. (1912), p. 198, 1913.	Dolerite.	
280	"II.5.3(4)."4.	or 12.23 di 7.29 ab 23.06 hy 12.81 an 29.47 ol 7.25 mt 1.86 fl 2.43 ap 1.34	Durras Mountain, New South Wales.	J. C. H. Min- gaye.	N. S. W. Dep. Min. A. R. (1912), p. 198, 1913.	Olivine dolerite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
281	49.26	18.56	3.80	6.12	3.71	7.40	3.61	2.21	1.64	0.95	1.85	0.78	0.21	CO ₂ 0.20 ZrO ₂ none SO ₃ trace Cr ₂ O ₃ trace V ₂ O ₅ 0.01 NiO none BaO 0.02 SrO trace Cu trace	100.33	
A1. I	.821	.182	.024	.085	.093	.132	.058	.023			.023	.005	.003			
282	48.98	16.88	3.30	7.29	5.27	8.86	3.39	2.11	1.78	0.52	1.28	0.30	0.31	CO ₂ 0.06 ZrO ₂ none SO ₃ none Cl 0.02 F none Cr ₂ O ₃ none V ₂ O ₅ 0.02 NiO 0.04 BaO trace SrO trace Li ₂ O trace CuO none	100.41	2.869
A1. I	.816	.166	.021	.101	.132	.159	.055	.022			.016	.002	.004			
283	48.48	16.71	5.93	5.96	4.19	7.02	3.38	1.78	1.44	2.07	2.50	0.59	0.12	CO ₂ 0.04 ZrO ₂ none SO ₃ 0.10 Cl 0.07 Cr ₂ O ₃ trace V ₂ O ₅ 0.02 NiO 0.03 BaO 0.05 SrO trace Li ₂ O trace CuO 0.01	100.49	2.761
A1. I	.808	.164	.037	.083	.105	.125	.055	.020			.031	.004	.002			
284	48.27	18.02	12.06	0.90	1.17	6.06	3.73	3.33	0.52	0.85	4.87	trace	0.03	CO ₂ 0.30 ZrO ₂ 0.04 SO ₃ none Cl trace F 0.11 NiO 0.04 BaO none SrO none Li ₂ O none	100.30	
A1. I	.805	.176	.076	.013	.029	.108	.060	.035			.061	---	---			
285	46.42	17.42	3.70	7.45	6.61	8.56	3.61	1.80	1.52	0.34	1.88	0.87	0.02	CO ₂ 0.04 ZrO ₂ none SO ₃ none Cl 0.05 Cr ₂ O ₃ trace V ₂ O ₅ 0.01 NiO 0.02 BaO 0.03 SrO trace Li ₂ O none	100.35	2.905
A1. I	.774	.171	.023	.104	.165	.153	.058	.019			.024	.006	---			
286	47.80	18.02	1.77	9.46	3.96	8.54	3.74	1.12	1.15		3.53	0.27	0.30		99.66	
A2. II	.797	.176	.011	.132	.099	.153	.060	.012			.044	.002	.004			
287	46.43	17.60	8.51	2.44	8.03	8.12	3.56	0.92	1.20	0.81	2.25	0.37	0.22	CO ₂ trace NiO 0.07	100.53	2.94
A2. II	.774	.173	.053	.034	.201	.145	.057	.010			.028	.003	.003			
288	54.06	17.13	6.10	3.55	3.05	4.88	3.97	3.29	1.00	0.80	1.95	0.48	0.20	CO ₂ none SO ₃ none Cl trace NiO 0.03	100.71	2.722
A2. II	.901	.168	.038	.049	.076	.088	.065	.035			.024	.003	.003			
289	51.52	16.58	2.35	7.68	4.03	6.10	4.11	2.99	0.22	1.39	2.15	0.82	0.13	CO ₂ trace Cl 0.05 NiO 0.06	100.18	2.787
A2. II	.859	.163	.015	.107	.101	.109	.066	.032			.027	.006	.002			
290	50.14	16.91	3.26	9.15	2.62	5.18	3.80	2.78	2.16	0.14	1.90	1.19	0.38	CO ₂ trace SO ₃ none Cl trace Li ₂ O none	99.61	2.786
A2. II	.836	.166	.020	.127	.066	.033	.061	.030			.024	.008	.005			
291	48.83	16.69	2.66	8.40	5.56	7.95	2.92	2.10	0.66	1.34	2.85	0.74	0.25	CO ₂ trace SO ₃ none Cl 0.04 Li ₂ O none	100.99	2.870
B2. III	.814	.164	.017	.117	.139	.142	.047	.022			.036	.065	.004			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
281	II.5.3.4.⊙	or 12.79 di 3.16 ab 30.39 hy 9.90 an 28.08 ol 2.39 mt 5.57 il 3.50 ap 1.68	The Canoblas, New South Wales.	W. G. Stone.	G. W. Card, pers. com.	Olivine basalt.	
282	II''5.3.4.	or 12.23 di 14.28 ab 27.25 ol 10.68 an 24.74 mt 4.87 ne 0.85 il 2.43 ap 0.68	St. Georges Head, Nowra District, New South Wales.	H. P. White.	G. W. Card, Rec. G. S. N. S. W., VIII, p. 91, 1905.	Basalt.	
283	II.5.3.4⊙	Q 2.22 di 5.07 or 11.12 hy 10.08 ab 28.82 mt 8.58 an 24.74 il 4.71 ap 1.34	Ballina, Richmond River, New South Wales.	J. C. H. Min- gaye.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 304, 1904.	Basalt.	
284	II.5.3.(3)4.	Q 1.02 hy 2.90 or 19.46 il 1.98 ab 31.44 hml2.06 an 22.52 tn 5.29 ru 1.68	Billy Kings Creek, Coonabarabran, Warrumbungle Mountains, New South Wales.	H. I. Jansen.	H. I. Jansen, Pr. Linn. Soc. N. S. W., XXXII, p. 616, 1907.	Corundum basalt.	
285	II(III).5.3.4.	or 10.56 di 8.74 ab 24.63 ol 14.31 an 26.13 mt 5.34 ne 3.12 il 3.65 ap 2.02	Mount Tomah, New South Wales.	J.C.H.Mingaye.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 304, 1904.	Basalt.	
286	II''5.3''4''.	or 6.67 di 9.68 ab 31.44 hy 0.93 an 28.91 ol 10.96 mt 2.55 il 6.69 ap 0.67	Clifton Hill, Victoria.	H. C. Richards.	H. C. Richards, pers. com.	Basalt.	
287	''II.5.3(4).4(5).	or 5.56 di 3.26 ab 29.87 hy 3.20 an 29.47 ol 9.80 mt 2.09 il 4.26 ap 7.04	Greensborough, Nillumbik Parish, Victoria.	N. R. Jenner.	N. R. Jenner, Pr. R. Soc. Vict., XXV (2), p. 335, 1913.	Basalt.	
288	II.5.(2)3.(3)4.	Q 4.74 di 2.16 or 19.46 hy 6.80 ab 34.06 mt 6.50 an 18.90 il 3.65 hm 1.60 ap 1.01	Sugarloaf Hill, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, Vict. G. S. B. 24, p. 25, 1912.	Olivine trachyte.	
289	II.5.(2)3.''4.	or 17.79 di 5.40 ab 34.58 hy 4.41 an 18.07 ol 9.06 mt 3.48 il 4.10 ap 2.02	Cobaw, Macedon, Victoria.	A. A. Topp.	Skeats and Summers, Vict. G. S. B. 24, p. 25, 1912.	Olivine trachyte.	
290	II.5.''3.''4.	or 16.68 hy 18.22 ab 31.96 mt 4.64 an 18.90 il 3.65 C 0.71 ap 2.69	Emu Creek, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, Vict. G. S. B. 24, p. 31, 1912.	Macedonite (orthoclase basalt).	
291	II(III).5.3''''4.	or 12.23 di 6.77 ab 24.63 hy 13.98 an 26.41 ol 3.70 mt 3.94 il 5.47 ap 1.68	Sugarloaf Hill, Macedon, Victoria.	P. G. W. Bayley.	Skeats and Summers, Vict. G. S. B. 24, p. 33, 1912.	Anorthoclase basalt.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
292	50.69	15.64	9.64	2.04	5.51	7.52	3.25	1.05	0.87	1.06	2.05	0.36	0.12	CO ₂ none SO ₃ trace Cl trace Cr ₂ O ₃ 0.06 NiO 0.06 Li ₂ O trace	99.92	2.797
A1. I	.845	.153	.060	.028	.138	.134	.053	.012			.026	.003	.002			
293	49.93	15.99	1.56	7.32	6.83	9.12	3.54	1.54	1.55	0.36	1.95	0.40	0.07	CO ₂ none SO ₃ trace Cl trace NiO 0.03 Li ₂ O trace	100.19	2.865
A2. II	.832	.157	.010	.102	.171	.163	.057	.016			.024	.003	.001			
294	48.84	14.95	2.79	8.53	4.73	7.47	3.90	2.01	1.53	0.67	4.00	0.52	0.13	CO ₂ none SO ₃ trace Cl trace F 0.08 NiO 0.03 Li ₂ O trace	100.18	2.908
A1. I	.814	.147	.018	.118	.118	.134	.063	.021			.050	.004	.002			
295	49.35	17.61	1.50	9.72	3.17	7.71	3.10	1.56	2.56	0.65	2.83	trace	0.07	FeS ₂ 0.34	100.17	2.918
A2. II	.823	.173	.009	.135	.079	.138	.050	.017			.035	—	.001			
296	47.46	16.12	2.96	9.39	5.70	7.27	3.51	1.74	0.57	0.72	3.10	0.78	0.25	CO ₂ none Cl trace Cr ₂ O ₃ 0.02 NiO 0.05	99.64	2.824
A1. I	.791	.158	.019	.131	.143	.130	.056	.019			.039	.003	.004			
297	50.63	16.30	5.34	6.46	6.62	7.65	3.22	1.69	0.89	0.14	0.80			CO ₂ none SrO trace	99.74	
A3. III	.844	.160	.033	.090	.166	.137	.052	.018			.010					
298	49.29	18.81	3.57	7.78	3.28	9.25	3.07	2.10	1.07	0.20	2.17			CO ₂ trace	100.59	
A3. III	.822	.184	.022	.108	.082	.165	.050	.022			.027					
299	59.04	15.74	0.60	3.66	4.48	7.59	4.90	1.47	0.39	0.04	0.61	0.68	0.18	CO ₂ 0.14 ZrO ₂ 0.03 FeS ₂ 0.15 Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.13 BaO 0.05	99.80	2.80
A1. I	.984	.154	.004	.051	.112	.136	.079	.016			.008	.005	.003			
300	57.32	17.69	2.24	5.62	3.66	6.50	4.04	1.25	0.13		0.85		0.21	CO ₂ 0.67	100.18	
A2. II	.955	.173	.014	.078	.092	.116	.065	.014			.011		.003			
301	52.46	18.58	4.76	4.03	4.72	8.56	3.86	1.14	0.47	0.10	0.60	0.51	0.14	CO ₂ none	99.93	
A2. II	.874	.182	.030	.056	.118	.153	.062	.012			.008	.004	.002			
302	58.35	20.44	2.51	2.44	1.63	7.45	4.22	2.53	0.20		0.43		0.07		100.27	
A2. II	.973	.200	.016	.034	.041	.133	.068	.027			.005		.001			
303	56.28	18.81	5.15	1.85	2.27	7.72	3.66	2.10	1.55		0.95		0.06		100.40	
A2. II	.938	.184	.032	.026	.057	.138	.059	.022			.012		.001			
304	55.77	17.36	4.36	3.64	2.73	8.45	3.72	2.27	0.70		0.74		0.07		99.81	
A2. II	.930	.170	.028	.050	.068	.151	.060	.024			.009		.001			
305	53.95	19.63	3.17	4.06	3.33	9.05	3.38	1.84	0.35		0.97	0.39		CO ₂ none	100.32	
A2. II	.899	.192	.020	.057	.083	.162	.055	.020			.012	.003				
306	52.21	19.33	4.12	4.81	3.25	9.01	3.37	1.92	0.88		1.05		0.20		100.15	
A2. II	.870	.190	.026	.067	.081	.161	.055	.020			.013		.003			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
292	II''.(4)5.3''4.	Q 6.30 di 7.78 or 6.67 hy 10.20 ab 27.77 mt 0.93 an 24.46 il 9.35 hm 8.96 ap 1.01	Lake Terang, Camperdown District, Victoria.	A. A. Topp.	H. J. Grayson, Vict. G. S. Mem. 9, p. 22, 1910.	Basalt.	
293	II(III).5.3.4.	or 8.90 di 15.54 ab 29.87 hy 0.53 an 23.35 ol 13.16 mt 2.32 il 3.65 ap 1.01	Lake Bullenmeri, Camperdown District, Victoria.	A. G. Hall.	H. J. Grayson, Vict. G. S. Mem. 9, p. 22, 1910.	Essexite.	
294	II(III).5.''3.4.	or 11.68 di 13.07 ab 33.01 hy 2.86 an 17.51 ol 6.68 mt 4.18 il 7.60 ap 1.34	Lake Bullenmeri, Camperdown District, Victoria.	A. G. Hall.	H. J. Grayson, Vict. G. S. Mem. 9, p. 22, 1910.	Essexite.	
295	II''5.3(4).4.	Q 0.36 di 7.45 or 9.45 hy 16.30 ab 26.20 mt 2.09 an 29.47 il 5.32	Mount Wellington, North Gippsland, Victoria.	Ampt.	E. V. Thiele, Pr. R. Soc. Vict., XXI (1), p. 267, 1908.	Basalt.	
296	II(III).5.3.4.	or 10.56 di 6.12 ab 29.34 hy 5.44 an 23.07 ol 11.71 mt 4.41 il 5.93 ap 2.02	Newlyn, Victoria.	D. J. Maloney.	A. R. Sec. Min. Vict. (1911), p. 62, 1912.	Basalt.	
297	II(III).5.3.4.	or 10.01 di 10.44 ab 27.25 hy 14.23 an 25.02 ol 2.61 mt 7.66 il 1.52	Blinman, Flinders Ranges, South Australia.	W. N. Benson.	W. N. Benson, Pr. R. Soc. S. Aust., XXXIII, p. 234, 1909.	Gabbro diabase.	
298	II.5.3(4).4.	or 12.23 di 12.15 ab 26.20 hy 3.85 an 31.14 ol 4.31 mt 5.10 il 4.10	Blinman, Flinders Ranges, South Australia.	W. N. Benson.	W. N. Benson, Pr. R. Soc. S. Aust., XXXIII, p. 234, 1909.	Olivine diabase.	
299	II.''5.(2)3.4''.	Q 4.92 di 13.47 or 8.90 hy 10.23 ab 41.39 mt 0.93 an 16.40 il 1.22 ap 1.68	Kalgoorlie, West Australia.	H. Bowley.	Simpson and Gibson, W. Aust. G. S. B. 42, p. 61, 1912.	Porphyrite.	
300	II.(4)5.3.4''.	Q 7.38 di 5.01 or 7.78 hy 14.14 ab 34.06 mt 3.25 an 26.13 il 1.67	Te Moehan Moun- tain, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, N. Z. G. S. B. 4, p. 90, 1907.	Quartz diorite.	Fresh?
301	II.5.3''4''.	Q 2.64 di 7.07 or 6.67 hy 11.08 ab 32.49 mt 6.96 an 30.02 il 1.22 ap 1.34	Hollyford River, Otago, New Zealand.	J. S. Maclaurin.	P. G. Morgan, pers. com.	Norite.	
302	(I)II.''5.3.4.	Q 6.60 di 6.27 or 15.01 hy 2.92 ab 35.63 mt 3.71 an 29.19 il 0.76	New Plymouth, Taranaki, New Zealand.	J. S. Maclaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Andesite.	
303	''II.(4)5.3.4.	Q 9.24 di 7.56 or 12.23 hy 2.20 ab 30.92 mt 3.48 an 28.63 il 1.82 hm 2.72	New Plymouth, Taranaki, New Zealand.	J. S. Maclaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Andesite.	
304	II.''5.3.4.	Q 6.42 di 14.39 or 13.34 hy 1.80 ab 31.44 mt 6.50 an 23.91 il 1.37	Mount Egmont, Taranaki, New Zealand.	J. S. Maclaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Andesite.	
305	II.5.3(4).4.	Q 4.32 di 7.82 or 11.12 hy 7.84 ab 28.82 mt 4.64 an 32.53 il 1.82 ap 1.01	New Plymouth, Taranaki, New Zealand.	J. S. Maclaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Andesite.	
306	II.5.3(4).4.	Q 1.92 di 10.36 or 11.12 hy 7.18 ab 28.82 mt 6.03 an 31.97 il 1.98	Sentry Hill, Taranaki, New Zealand.	J. S. Maclaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Andesite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
307	50.89	17.75	2.32	7.20	3.30	7.70	3.83	2.43	2.35		1.97		0.21		100.00	
A2. II	.848	.174	.014	.100	.083	.138	.062	.026			.025		.003			
308	51.97	15.37	6.76	7.89	2.42	7.96	3.31	1.26	2.39			0.33		FeS ₂ 0.53	100.19	2.843
A3. III	.866	.151	.043	.110	.061	.142	.053	.013				.002				
309	50.92	17.59	3.80	6.69	3.90	6.97	4.28	1.86	0.79	0.35	2.55	0.40	0.20	CO ₂ none Cr ₂ O ₃ none NiO none	100.30	2.761
A2. II	.849	.172	.024	.093	.098	.124	.069	.020			.032	.003	.003			
310	49.73	16.39	7.58	3.98	4.06	7.17	4.12	1.93	0.54	0.81	3.05	0.84	0.23	CO ₂ none ZrO ₂ 0.03 SO ₃ none Cr ₂ O ₃ none NiO 0.04 BaO 0.03 SrO none	100.53	2.911
A1. I	.829	.161	.048	.055	.102	.128	.066	.020			.038	.006	.003			
311	49.01	16.29	7.61	4.89	3.62	9.79	3.82	0.80			3.93	0.49	0.27	SO ₃ 0.20 S 0.02 CuO 0.10	100.84	
A2. II	.817	.160	.048	.068	.091	.175	.061	.009			.047	.003	.004			
312	48.71	18.87	3.18	8.00	4.85	9.87	4.15	1.52	none		1.81	trace	trace		100.96	2.99
B3. IV	.812	.185	.020	.111	.121	.177	.067	.016			.023	—	—			
313	45.61	15.98	8.25	11.60	3.75	6.42	3.50	1.82	0.27		1.15	0.72	1.20		100.27	
A2. II	.760	.157	.052	.161	.094	.114	.056	.019			.014	.005	.017			
314	46.30	17.95	6.21	6.79	3.67	8.17	3.92	0.89			5.35	0.53	0.26	SO ₃ 0.06 S 0.05 CuO 0.17	100.32	
A2. II	.772	.176	.039	.094	.092	.146	.063	.010			.067	.004	.004			
315	54.04	19.58	5.09	3.75	1.99	5.54	4.70	3.48	1.16		0.94	0.31			100.58	
A2. II	.901	.192	.032	.052	.050	.099	.076	.037			.012	.002				
316	51.18	21.41	4.61	3.32	1.75	6.56	4.72	3.53	1.08		1.34	0.48			99.98	
A2. II	.853	.210	.029	.046	.044	.117	.076	.037			.017	.003				
317	52.81	16.11	7.16	7.48	3.55	6.62	3.52	1.20	0.85						99.30	
B3. IV	.880	.158	.045	.104	.089	.118	.056	.013								
318	49.95	15.21	7.45	8.02	3.32	8.16	3.31	1.55	1.10		0.60	0.68			99.35	
B2. III	.833	.149	.047	.111	.083	.146	.053	.017			.008	.005				
319	49.71	16.74	8.89	6.69	3.63	7.82	3.90	1.05	1.21						99.64	
A3. III	.829	.164	.056	.093	.091	.139	.063	.012								
320	45.99	15.91	11.80	5.62	5.43	7.94	3.89	1.06	1.48		0.49	0.21			99.82	
A2. II	.767	.156	.074	.078	.136	.142	.063	.012			.006	.002				
321	45.67	16.61	12.42	5.30	5.26	8.44	4.02	1.20	0.76						99.68	
A3. III	.761	.163	.078	.074	.132	.151	.065	.013								

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4. DOSODIC. ANDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
307	II.5.3.4.⊙	or 14.46 di 11.97 ab 31.96 ol 7.96 an 23.91 mt 3.25 ne 0.28 il 3.80	Te Ahuabu Hill, Whangaroa, New Zealand.	J. S. MacLaurin.	Bell and Clarke, N. Z. G. S. B. 8, p. 75, 1909.	Basalt.	
308	II''(4)5.3''4.	Q 7.32 di 11.63 or 7.23 hy 9.11 ab 27.77 mt 9.93 an 23.63 ap 0.67 pr 0.53	Baining Mountains, Neupommern Island, Bismarck Archipelago.	A. Lindner.	E. Lehmann, T. M. P. M., XXVII, p. 200, 1908.	Monzonite.	
309	II.5.3.4.⊙	or 11.12 di 6.99 ab 36.15 hy 7.31 an 23.07 ol 3.18 mt 5.57 il 4.86 ap 1.01	Mauna Kea, Hawaii, Hawaiian Islands.	G. Steiger.	R. A. Daly, Pr. Am. Ac., XLVII, p. 104, 1911.	Trachy- dolerite.	Also in J. G., XIX, p. 301, 1911.
310	II.5.3.4.⊙	Q 1.68 di 7.13 or 11.12 hy 6.90 ab 34.58 mt 4.64 an 20.85 il 5.78 hm 4.48 ap 2.02	Mauna Kea, Hawaii, Hawaiian Islands.	G. Steiger.	R. A. Daly, Pr. Am. Ac., XLVII, p. 104, 1911.	Basalt.	Also in J. G., XIX, p. 298, 1911.
311	II(III).5.3''4(5).	Q 3.06 di 16.20 or 5.00 hy 1.60 ab 31.96 mt 5.80 an 25.02 il 7.14 hm 3.68 ap 1.01	Mount Kohala, Hawaii, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Ignited. H ₂ O+=1.00. H ₂ O-=0.98. In W. T., p. 285.
312	II''5(6).3.4.	or 8.90 di 16.97 ab 22.53 ol 9.39 an 28.36 mt 4.64 ne 6.82 il 3.50	Crater Wall, Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. Com. G. It., XIX, p. 187, 1888.	Basalt.	In W. T., p. 283.
313	II(III).5.3.4.	or 10.56 di 3.50 ab 29.34 hy 13.12 an 22.80 ol 13.12 mt 12.06 il 2.13 ap 1.68	Crater Wall, Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. Com. G. It., XIX, p. 173, 1888.	Basalt.	In W. T., p. 283.
314	II''5.3''4(5).	Q 0.36 di 6.48 or 5.56 hy 6.20 ab 33.01 mt 7.19 an 28.63 il 10.18 hm 1.28 ap 1.34	Waianae, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Ignited. H ₂ O+=2.00. H ₂ O-=1.75. In W. T., p. 285.
315	''II.5.''3.''4.	or 20.57 di 2.87 ab 39.82 hy 3.43 an 21.96 ol 0.90 mt 7.42 il 1.82 ap 0.67	Fortress Hill, Ascension Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 652, 1912.	Trachy- dolerite.	Al ₂ O ₃ and MgO?
316	(I)II.5.3.''4.	or 20.57 di 2.16 ab 32.49 ol 2.38 an 26.97 mt 6.73 ne 3.41 il 2.58 ap 1.01	Near Pier, Ascension Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 652, 1912.	Trachy- dolerite.	Al ₂ O ₃ and MgO?
317	II.(4)5.3''4.	Q 6.66 di 6.64 or 7.23 hy 13.40 ab 29.34 mt 10.44 an 24.74	Bouvet Island.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 54, 1908.	Basalt.	
318	II(III)''5.3.4.	Q 3.96 di 11.44 or 9.45 hy 10.05 ab 27.77 mt 10.90 an 21.96 il 1.22 ap 1.68	Bouvet Island.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 54, 1908.	Basalt.	
319	II''5.3.4''.	Q 1.38 di 11.25 or 6.67 hy 8.54 ab 33.01 mt 12.99 an 24.74	Bouvet Island.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 54, 1908.	Basalt.	
320	II(III).5.3.4''.	or 6.67 di 11.66 ab 28.50 ol 4.90 an 22.52 mt 16.70 il 0.91 bm 0.32 ap 0.67	Stationsberg, Kerguelen Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (2), p. 218, 1908.	Basalt.	
321	II(III).5.3.4''.	or 7.23 di 14.26 ab 28.50 ol 4.62 an 23.43 mt 17.17 ne 2.96 hm 0.64	Philippi Lake, Kerguelen Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (2), p. 218, 1908.	Basalt.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
322	51.76	17.54	5.40	6.94	2.89	7.85	3.51	0.87	2.41		0.96				100.13	
A3. III	.863	.172	.034	.096	.072	.140	.056	.009			.012					
323	56.30	15.91	3.15	6.38	3.64	8.10	3.41	1.17	1.74		0.06	0.16	trace		100.02	
A2. II	.938	.156	.020	.089	.091	.145	.055	.013			—	.001	—			
324	54.61	19.10	3.65	3.73	3.06	6.51	4.34	1.27	2.63		1.66	0.32			100.56	
A2. II	.910	.187	.023	.051	.077	.116	.070	.014			.021	.002				
325	53.06	18.65	1.44	7.58	3.78	8.22	3.20	1.55	0.94	0.16	1.60	0.38	0.05		100.61	
A2. II	.884	.183	.009	.106	.095	.146	.052	.017			.020	.003	—			
326	54.27	19.23	0.73	8.29	3.74	6.41	3.05	2.49	0.77	0.18	1.33			CO ₂ 0.05	100.54	
A3. III	.905	.188	.004	.115	.094	.114	.050	.027			.017				(100.55)	
327	51.91	20.75	1.08	7.32	3.05	7.07	3.04	2.44	0.58	0.04	2.34	0.52	trace	CO ₂ 0.11	100.25	
A2. II	.865	.203	.007	.102	.076	.127	.049	.026			.027	.004	—			
328	51.35	18.90	2.03	7.87	3.30	8.81	3.73	1.48	0.97	0.09	0.79	0.57	trace	CO ₂ 0.01	99.90	
A2. II	.856	.185	.013	.109	.083	.157	.060	.016			.010	.004	—			
329	51.56	17.95	3.46	6.93	5.54	7.05	3.56	1.28	1.58		1.34	0.10			100.35	
A2. II	.859	.176	.022	.096	.139	.126	.057	.014			.017	.001				

RANG 3. ALKALICALCIC. ANDASE.

1	57.47	18.86	2.21	4.08	4.27	7.42	3.85	0.73	0.22		0.75	0.24	0.10	BaO 0.03 SrO 0.11	100.34	
A2. II	.958	.185	.014	.057	.107	.132	.062	.008			.009	.002	.001			
2	56.95	18.84	2.06	4.28	4.37	7.45	3.89	0.82	0.31	0.19	0.79	0.19	trace	CO ₂ none S trace Cr ₂ O ₃ none BaO 0.04 SrO trace Li ₂ O none	100.18	
A1. I	.949	.185	.013	.060	.109	.133	.063	.009			.010	.001	—			
3	57.87	16.30	1.71	3.86	5.50	5.53	5.01	0.75	2.40	0.26	0.53	0.27	0.08	BaO 0.05 SrO trace	100.12	
A2. II	.964	.161	.011	.054	.138	.099	.080	.008			.007	.002	.001			
4	55.08	18.93	2.02	5.56	5.17	8.40	4.23	0.74	0.29		trace				100.42	
A3. III	.918	.185	.013	.077	.129	.150	.068	.008			—					
5	49.26	16.88	6.49	6.94	4.80	7.58	3.41	0.72	2.90	0.41	trace	0.34	0.61	ZrO ₂ none S trace NiO 0.05 BaO none SrO trace	100.39	2.95
A2. II	.821	.164	.041	.096	.120	.136	.055	.007			—	.002	.008			
6	51.72	15.38	3.35	7.91	4.38	7.84	4.37	0.47	2.00	0.56	1.67	0.49	0.16	CO ₂ none SO ₃ 0.03 Cl 0.12 F none Cr ₂ O ₃ none	100.45	
A1. I	.862	.151	.021	.110	.110	.140	.071	.005			.021	.005	.002			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBBRANG 4. DOSODIC. ANDASE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
322	II."5.3(4).4(5).	Q 6.24 di 7.55 or 5.00 hy 10.08 ab 29.34 mt 7.89 an 29.75 il 1.82	Mount Menhir, Campbell Island.	P. Marshall.	P. Marshall, Subant. Islands, p. 690, 1909.	Gabbro.	
323	II.(4)5.3".4.	Q 8.40 di 12.40 or 7.23 hy 12.07 ab 28.82 mt 4.64 an 24.46 ap 0.34	Two Hammocks Island, 64° 6' S., 61° 41' W., Antarctica.	E. Zdarek.	A. Pelikan, Voy. Belgica, V, Pet. Unt., I, p. 13, 1909.	Quartz diorite.	
324	II."5.3.4".	Q 6.60 di 1.33 or 7.78 hy 7.99 ab 36.68 mt 5.34 an 28.63 il 3.19 ap 0.67	Port Lockroy, Graham Land, Antarctica.	Pisani.	E. Gourdon, Exp. Ant. Fr., Petr., p. 175, 1908.	Hornblende andesite.	
325	II.5.3(4).4.	Q 2.88 di 5.07 or 9.45 hy 17.14 ab 27.25 mt 2.06 an 31.69 il 3.04 ap 1.01	Cathedral Rocks, South Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 127, 1907.	Hornblende diorite.	
326	II.5.3".(3)4.	Q 1.80 di 0.71 or 15.01 hy 21.44 ab 26.20 mt 0.93 an 30.86 il 2.58	Cape Irizar? Ross Region, South Victoria Land, Antarctica.	Burrows and Walkom.	J. W. E. David, pers. com.	Not named.	Dike in granite.
327	II.5.3(4).(3)4.	Q 2.58 hy 16.58 or 14.46 mt 1.62 ab 25.68 il 4.10 an 31.69 ap 1.34 C 1.43	Mount Larsen, Ross Region, South Victoria Land, Antarctica.	Burrows and Walkom.	J. W. E. David, pers. com.	Sphene diorite.	Erratic block.
328	II.5.3".4.	or 8.90 di 8.14 ab 31.44 hy 10.47 an 30.30 ol 3.78 mt 3.02 il 1.52 ap 1.34	Mount Larsen, Ross Region, South Victoria Land, Antarctica.	Burrows and Walkom.	J. W. E. David, pers. com.	Not named.	Erratic block.
329	II.5.3(4).4.	Q 1.14 di 4.05 or 7.78 hy 18.14 ab 29.87 mt 5.10 an 29.19 il 2.58 ap 0.34	Jenny Island, Weddell quadrant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Gabbro.	

SUBBRANG 5. PERSODIC. BEERBACHOSE. (C. I. P. W., 1902.)

1	II.(4)5.3(4).(4)5.	Q 9.12 di 3.16 or 4.45 hy 13.79 ab 32.49 mt 3.75 an 31.97 il 1.37 ap 0.34	Near Crater Lake, Oregon.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 231, 1897.	Basalt.	In W. T., p. 285.
2	II.(4)5.3(4).(4)5.	Q 7.68 di 3.83 or 5.00 hy 13.92 ab 33.01 mt 3.02 an 31.41 il 1.52 ap 0.34	Anna Creek, Crater Lake, Oregon.	H. N. Stokes.	H. B. Patton, U. S. G. S. P. P. 3, p. 161, 1902.	Hypersthene basalt.	
3	II."5.3."5.	Q 5.78 di 4.23 or 4.48 hy 16.66 ab 41.92 mt 2.55 an 20.29 il 1.06 ap 0.67	South Husent Creek, Butte County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17 (I), p. 731, 1896.	Diorite.	Also in J. G., III, p. 403, 1895. In W. T., p. 285.
4	II.5.3".(4)5.	Q 0.60 di 9.31 or 4.45 hy 16.80 ab 35.63 mt 3.02 an 30.30	Delta, Shasta County, California.	W. H. Melville.	J. S. Diller, U. S. G. S. B. 148, p. 190, 1897.	Andesite- basalt.	In W. T., p. 285.
5	II(III).5.3(4).(4)5.	Q 1.50 di 8.41 or 3.89 hy 16.20 ab 28.82 mt 9.31 an 28.36 ap 0.67	Pajaro, San Benito County, California.	J. E. Reid.	J. E. Reid, Un. Cal. Dep. G. B., III, p. 185, 1902.	Diorite.	
6	II(III).5.3."5.	Q 1.26 di 12.55 or 2.78 hy 14.07 ab 37.20 mt 4.87 an 20.85 il 3.19 ap 1.01	Point Farfan, Panama.	W. C. Wheeler.	D. F. MacDonald, U. S. G. S. rec. lab.	Diorite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. ANDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	57.25	18.00	2.17	4.25	4.52	7.68	3.67	0.77	0.50		0.43	trace			99.24	
B3. IV	.954	.176	.014	.059	.113	.138	.059	.008			.005	—				
8	52.55	14.20	9.43	6.50	4.03	6.68	4.51	0.20	1.62						99.72	2.905
A3. III	.876	.139	.059	.090	.101	.120	.073	.002								
9	48.42	17.49	6.79	4.34	5.35	9.83	3.98	0.55	2.68						99.43	2.902
A3. III	.807	.171	.043	.060	.134	.175	.065	.006								
10	52.31	17.38	2.99	5.21	3.76	9.95	3.96	0.75	2.05	0.30	1.45	0.20	0.22	CO ₂ trace Cl 0.02	100.55	2.87
A2. II	.872	.170	.019	.072	.094	.178	.064	.008			.018	.001	.003			
11	52.82	16.39	2.31	10.92	3.43	7.87	4.83	0.92	0.48				trace		99.97	
A3. III	.880	.160	.014	.151	.086	.141	.077	.010					—			
12	51.70	19.39	2.54	6.44	4.64	8.95	4.07	0.83	0.92	0.15	0.14	0.37		FeS ₂ 0.48	100.62	
A2. II	.862	.190	.016	.089	.116	.160	.066	.009			.002	.003				
13	47.21	20.52	7.48	5.32	4.16	8.63	5.17	0.33	0.34	0.10		0.46		FeS ₂ 0.19	99.91	
A3. III	.787	.201	.047	.074	.104	.153	.084	.003				.003				
14	53.34	15.95	2.43	4.93	5.23	7.96	5.42	0.63	2.75	0.09	1.21	0.63			100.57	2.84
A2. II	.889	.156	.015	.068	.131	.142	.087	.007			.015	.004				
15	44.37	16.69	8.03	7.64	4.07	7.44	3.99	0.65	3.23		3.07	0.42	trace		99.60	2.93
A2. II	.740	.163	.050	.106	.102	.133	.065	.007			.036	.003	—			
16	51.00	18.01	0.23	9.31	6.53	8.89	4.42	0.46	1.38	0.28					100.51	
A3. III	.850	.176	.001	.129	.163	.159	.071	.005								
17	50.13	16.90	2.19	7.55	5.71	6.83	4.95	0.95	2.45	0.77	1.26	0.24	0.12		100.06	2.60
A2. II	.836	.166	.014	.105	.143	.121	.080	.010			.016	.002	.002			
18	51.80	16.63	2.72	7.91	5.34	8.38	3.89	0.29	0.88	1.10	0.82	0.26	0.23		100.25	
A2. II	.863	.163	.017	.110	.134	.150	.063	.003			.010	.002	.003			
19	53.50	17.62	2.58	6.07	4.39	9.22	4.57	0.33	none		1.65	0.36			100.29	
A2. II	.892	.173	.016	.085	.110	.164	.074	.004			.021	.003				
20	52.32	18.16	2.82	5.81	5.62	8.88	4.01	0.42	1.00		0.90	0.10			100.04	
A2. II	.872	.178	.018	.081	.141	.159	.065	.004			.011	.001				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 5. PERSODIC. BEERBACHOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	II.(4)5.3(4).(4)5.	Q 9.12 di 6.52 or 4.45 hy 13.42 ab 30.92 mt 3.25 an 30.30 fl 0.76	Vallée de Ceron, Martinique, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Andesilab- radorite (andesite).	
8	II(III).(4)5.3.5.	Q 6.60 di 12.52 or 1.11 hy 8.18 ab 38.25 mt 13.69 an 17.79	Red Point, St. Thomas, West Indies.	P. T. Cleve.	P. T. Cleve, Sv. Vet. Ak. Hnd., IX, No. 12, p. 37, 1871.	Diabase.	Cf. A. Högbom, B. G. Inst. Ups., VI, p. 230, 1905. Not in W. T.
9	II''5.3''5.	or 3.34 di 16.46 ab 33.01 ol 5.61 an 27.80 mt 9.98 ne 0.57	Coki Point, St. Thomas, West Indies.	E. Ecklund.	P. T. Cleve, Sv. Vet. Ak. Hnd., IX, No. 12, p. 37, 1871.	Diabase.	Cf. A. Högbom, B. G. Inst. Ups., VI, p. 230, 1905. Not in W. T.
10	II''5.3''(4)5.	Q 2.10 di 17.33 or 4.45 hy 6.01 ab 33.54 mt 4.41 an 27.24 fl 2.74 ap 0.34	Trwyn Llwyd, St. Davids Head, Pembrokeshire, Wales.	J. V. Elsdén.	J. V. Elsdén, Q. J. G. S., LXIV, p. 280, 1908.	Quartz gabbro.	
11	II''5.3''5.	or 5.56 di 16.03 ab 40.35 ol 13.39 an 20.29 mt 3.25	Wiborg, Finland.	H. Berghell.	H. Berghell, Fin. G. Und., Bl. 33, p. 26, 1898.	Diabase.	In W. T., p. 285.
12	II.5.3(4).(4)5.	or 5.00 di 7.98 ab 34.58 hy 8.06 an 31.97 ol 6.59 mt 3.71 fl 0.30 ap 1.01	Ernstshofen, Odenwald, Hesse.	W. Sonne.	C. Chelius, Nbl. Ver. Erdk. (IV), XVIII, p. 15, 1897.	Luciite porphyry.	In W. T., p. 285.
13	II.5''3.5.	or 1.67 di 6.45 ab 34.58 ol 7.81 an 31.69 mt 10.90 ne 5.11 ap 1.01	Frankenstein, Odenwald, Hesse.	R. Marzahn.	Chelius and Klemm, Erl. G. Kt. Hes., X, p. 39, 1896.	Beerbachite.	In W. T., p. 285.
14	II''5.(2)3''5.	or 3.80 di 14.95 ab 45.59 hy 3.42 an 17.24 ol 5.41 mt 3.48 fl 2.28 ap 1.34	Alp Rusein, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Kersantite.	
15	II''5.3.(4)5.	or 3.80 di 7.07 ab 34.06 hy 3.59 an 25.30 ol 4.21 mt 11.60 fl 5.47 ap 1.01	Nurra, Sardinia.	C. Viola.	C. Viola, B. Com. G. It., XXXVI, p. 107, 1905.	Hornblende diabase.	
16	II''5.3''5.	or 2.78 di 13.57 ab 31.96 ol 19.50 an 27.80 mt 0.23 ne 2.84	Mancayan, Lepanto Province, Luzon Island, Philippine Islands.	L. S. Salinger.	A. J. Eveland, Min. Bur. Manila, B. 4, p. 39, 1905.	Diorite.	
17	II.5.3.(4)5.	or 5.56 di 8.63 ab 38.77 ol 14.79 an 21.13 mt 3.25 ne 1.70 fl 2.43 ap 0.67	Karang Samboen, Loh-oels, Java.	N. Sahlbom.	G. Niethammer, T. M. P. M., XXVIII, p. 233, 1909.	Theralite- diabase.	
18	II(III).5.3(4)5.	Q 0.42 di 10.52 or 1.67 hy 19.58 ab 33.01 mt 3.94 an 26.97 fl 1.52 ap 0.67	Ipswich, Purga Parish, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1912.	Basalt.	H. C. Richards, pers. com.
19	II''5.3.5.	Q 1.02 di 13.32 or 2.22 hy 10.86 ab 38.77 mt 3.71 an 26.41 fl 3.19 ap 1.01	Deception Island, South Shetland Islands, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Labradorite (diabase?).	
20	II''5.3(4)5.	or 2.22 di 10.57 ab 34.06 hy 15.85 an 30.30 mt 4.18 fl 1.67 ap 0.34	Berthelot Island, Weddell quad- rant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Labradorite (basalt).	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE. (C. I. P. W., 1902.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	43.42	22.37	0.81	9.25	5.75	13.34	1.24	1.13	1.54	0.09	1.25	0.10	0.06	Cr ₂ O ₃ trace Li ₂ O trace	100.35	
A2. II	.724	.219	.005	.129	.144	.238	.020	.012			.016	.001	.001			
2	53.54	16.36	1.31	7.07	6.23	9.35	2.13	2.02	1.92		trace	0.12		SO ₃ 0.17	100.22	
A3. III	.892	.160	.008	.099	.156	.167	.034	.021			—	—	.001			
3	51.29	17.50	4.52	4.93	3.75	13.10	2.19	2.44	1.11		0.11				100.94	
B3. IV	.855	.171	.028	.068	.094	.234	.035	.025			.001					
4	53.57	16.96	2.08	7.29	3.70	9.55	2.15	2.03	1.17		1.15		0.35	CO ₂ none	100.00	
A2. II	.893	.166	.013	.101	.093	.171	.035	.021			.013		.005			
5	50.10	17.96	2.40	6.48	5.14	8.25	1.31	3.26	3.34		1.84			CO ₂ none Cr ₂ O ₃ none NiO none CuO none	100.08	
A2. II	.835	.176	.015	.090	.129	.147	.021	.035			.023					
6	44.17	18.91	8.34	5.62	4.87	10.64	1.61	1.50	0.55		2.84	0.24		CO ₂ 0.32 Cl 0.09	99.70	
A2. II	.736	.185	.052	.078	.122	.190	.026	.016			.036	.002				

RANG 4. DOCALCIC. HESSASE.

1	44.00	27.73	2.36	3.90	2.30	13.94	2.36	0.45	0.80		1.90	0.20	0.08		100.02	
A2. II	.733	.272	.015	.054	.058	.249	.038	.005			.024	.001	.001			
2	56.89	19.39	0.38	7.11	2.11	8.11	3.31	1.04	1.35		0.43	0.11	0.30		100.53	2.834
A2. II	.948	.190	.002	.099	.053	.145	.053	.011			.005	.001	.004			
3	51.52	19.77	0.47	6.77	6.49	8.16	2.66	0.70	1.68		1.39	0.10	trace		99.71	2.832
A2. II	.859	.194	.003	.094	.162	.146	.043	.008			.017	.001	—			
4	50.80	19.42	0.97	6.67	5.78	12.68	1.60	0.37	0.86	0.25	0.43			NiO 0.01	99.84	
A3. III	.847	.190	.006	.093	.145	.227	.026	.004			.005					
5	44.92	18.88	2.73	13.76	5.38	9.07	2.94	0.53	1.62	0.20			0.26		100.29	
A3. III	.749	.185	.017	.191	.135	.161	.047	.005					.004			
6	52.60	18.45	2.47	6.11	4.22	7.55	3.24	1.12	2.53		1.11	0.20	0.23		99.83	
A2. II	.877	.181	.015	.085	.106	.135	.052	.011			.014	.001	.003			
7	47.82	19.99	2.10	6.48	4.94	11.65	3.51	0.67	0.21	0.07	2.00	0.56	trace	CO ₂ none BaO trace	100.00	
A2. II	.797	.196	.013	.090	.124	.208	.056	.007			.025	.004	—			
8	43.73	20.17	4.32	6.93	3.91	10.99	2.42	1.45	1.02	0.08	4.23	0.15	trace		99.40	3.058
B2. III	.729	.198	.027	.097	.098	.196	.039	.015			.053	.001	—			
9	50.46	19.65	1.66	5.15	5.31	9.66	3.15	1.57	1.14	0.74	1.18	0.18	0.15	CO ₂ none BaO 0.09 SrO 0.03	100.12	
A2. II	.841	.193	.010	.072	.133	.172	.051	.017			.015	.001	.002			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 3. SODIPOTASSIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	II''5.4(5).3(4).	or 6.67 di 11.04 ab 5.24 ol 17.17 an 51.99 mt 1.16 ne 2.84 il 2.43 ap 0.34	Ilchester, Howard County, Maryland.	W. F. Hille- brand.	G. H. Williams, U. S. G. S. A. R. 15, p. 673, 1895.	Gabbro- diorite.	In W. T., p. 287.
2	II(III).5.''4.3(4).	Q. 2.76 di 13.44 or 11.68 hy 21.01 ab 17.84 mt 1.88 an 29.19 ap 0.34	Hippeln, Brocken, Harz.	Klüss.	O. H. Erdmannsdoerfer, Jb. Pr. G. L. -A., XXVII, p. 360, 1906.	Gabbro.	
3	II(III).5.(3)4.3''.	Q. 0.96 di 27.25 or 13.90 ol 1.20 ab 18.34 mt 6.50 an 30.86	Mal Inverno, Monzoni, Tyrol.	C. Doelter.	C. Doelter, T. M. P. M., XXI, p. 73, 1902.	Monzonite.	
4	II''.'5.''4.3(4).	Q. 6.18 di 14.08 or 11.68 hy 12.88 ab 18.34 mt 3.02 an 30.58 il 1.98	Flat Islands, Whangaroa, New Zealand.	J. S. MacLaurin.	Bell and Clarke, N. Z. G. S. B. 8, p. 71, 1909.	Dolerite.	
5	II.5.''4.(2)3.	Q. 3.06 di 6.09 or 19.46 hy 16.81 ab 11.00 mt 3.48 an 33.36 il 3.50	Champion Mine, Dun Mountains, Nelson, New Zealand.	J. S. MacLaurin.	J. M. Bell, N. Z. G. S. B. 12, p. 36, 1911.	Diabase.	
6	II(III).5.4.3(4).	Q. 2.16 di 8.64 or 8.90 hy 8.20 ab 13.62 mt 9.74 an 39.75 il 5.47 hm 1.60 ap 0.67	Sepia Temple, Vaisigan Valley, Upolu Island, Samoa.	A. Dieseldorff.	F. M. Möhle, N. J. B. B., XV, p. 99, 1902.	Basalt.	

SUBRANG 4-5. PRESODIC. HESSOSE. (C. I. P. W., 1902.)

1	(1)II.5''4''.(4)5.	or 2.78 di 3.80 ab 13.62 ol 4.37 an 63.46 mt 3.48 ne 6.25 il 3.65 ap 0.34	Brome Mountain, Quebec.	M. F. Connor.	J. A. Dresser, Can. G. S. A. R. XVI (1904), p. 10 G, 1906.	Essexite.	Also in A. J. S., XVII, p. 352, 1904.
2	II.(4)5.''4.4''.	Q. 8.82 di 3.78 or 6.12 hy 16.05 ab 27.77 mt 0.46 an 35.03 il 0.76 ap 0.34	Onaping, Sudbury, Ontario.	E. G. R. Ardagh.	A. P. Coleman, J. G., XV, p. 770, 1907.	Norite?	
3	II.5.4.4''.	Q. 1.86 hy 25.97 or 4.45 mt 0.70 ab 22.53 il 2.58 an 39.75 ap 0.34	Blezard Mine, Sudbury, Ontario.	T. L. Walker.	T. L. Walker, Q. J. G. S., LIII, p. 56, 1897.	Diabase.	In W. T., p. 287.
4	II(III).5.4''.(4)5.	Q. 3.18 di 15.24 or 2.22 hy 17.86 ab 13.62 mt 1.39 an 44.48 il 0.76	Kerr Lake Mine, Cobalt, Ontario.	R. E. Hore.	R. E. Hore, J. G., XVIII, p. 275, 1910.	Quartz diabase.	
5	II(III).5.4.(4)5.	or 2.78 di 6.56 ab 20.96 ol 25.13 an 36.97 mt 3.94 ne 1.99	Ottertail Creek, Nipissing District, Ontario.	F. G. Wait.	G. C. Hoffman, Can. G. S. A. R. IX (1896), p. 20 R, 1898.	Quartz diorite gneiss.	In W. T., p. 287.
6	II.''5.(3)4.4''.	Q. 5.04 di 3.19 or 6.12 hy 16.83 ab 27.25 mt 3.48 an 32.80 il 2.13 ap 0.34	East Clarendon, Vermont.	H. N. Stokes.	C. L. Whittle, U. S. G. S. B. 148, p. 71, 1897.	Hornblende granite.	In W. T., p. 287.
7	II''5. .4.(4)5.	or 3.89 di 13.97 ab 25.68 ol 9.07 an 36.97 mt 3.02 ne 1.99 il 3.80 ap 1.34	Tripyramid Mountain, Waterville, New Hampshire.	C. J. Monahan.	L. V. Pirsson, A. J. S., XXXI, p. 418, 1911.	Ossipite (gabbro).	
8	II.5.4.4.⊙	or 8.34 di 10.80 ab 18.60 ol 4.94 an 40.03 mt 6.26 il 8.06 ap 0.34	Nahant, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VII, p. 63, 1899.	Gabbro.	In W. T., p. 287.
9	II.5.(3)4.4.	or 9.45 di 9.88 ab 26.72 hy 5.85 an 34.75 ol 6.41 mt 2.32 il 2.28 ap 0.34	Prospect Hill, Litchfield, Connecticut.	W. F. Hille- brand.	W. H. Hobbs, Fests. Rosenb., p. 30, 1906.	Hornblende gabbro.	

CLASS II. DOSALANE—Continued.

RANG 4. DOALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
10	47.97	17.41	2.06	9.09	5.93	9.12	3.03	0.85	1.11	0.30	2.10	0.37	0.10	CO ₂ 0.43	99.92	
A2. II	.800	.171	.013	.126	.148	.163	.050	.009			.026	.003	.001			
11	56.94	20.82	0.83	3.02	2.36	9.41	3.36	1.58	0.59	0.21	0.44	0.07	0.11	CO ₂ 0.45 S trace Cr ₂ O ₃ trace NiO trace BaO 0.05 SrO trace	100.24	
A2. II	.949	.204	.005	.042	.059	.168	.054	.017			.006	—	.002			
12	53.18	23.25	1.53	1.82	2.60	11.18	3.97	0.86	0.98	0.15	0.45	0.09	0.11	CO ₂ 0.34 S trace BaO trace	100.51	
A2. II	.886	.228	.009	.025	.065	.200	.064	.009			.006	—	.002			
13	47.88	18.90	1.39	10.45	7.10	8.36	2.75	0.81	0.43	0.18	1.20	0.20	0.16	CO ₂ 0.12 S 0.07 Cr ₂ O ₃ trace V ₂ O ₅ trace NiO 0.02 BaO trace SrO trace	100.02	3.090
A1. I	.798	.185	.009	.145	.178	.149	.044	.008			.015	.001	.002			
14	46.10	18.66	3.00	9.58	6.71	8.26	2.57	1.59	0.18	0.10	2.88	0.70		Cl 0.02 S 0.18 BaO trace SrO trace	100.53	
A2. II	.768	.183	.019	.133	.168	.147	.042	.017			.036	.005			(100.52)	
15	45.91	19.83	2.91	3.09	5.13	9.32	2.78	1.23	0.40	0.14	2.71	1.03	0.07	CO ₂ 0.04 Cl 0.03 S 0.35 Cr ₂ O ₃ 0.01	100.03	
A1. I	.765	.195	.018	.113	.128	.166	.045	.013			.034	.007	.001			
16	52.97	23.27	1.31	3.31	2.20	10.08	4.09	0.62	0.69	0.53	0.38	0.22	0.19	CO ₂ 0.12	100.12	
A2. II	.883	.228	.003	.046	.055	.180	.066	.007			.005	.002	.003			
17	54.03	16.71	1.37	7.70	5.66	8.84	2.99	0.67	0.53	0.14	0.84	0.13	0.13	CO ₂ 0.40 S 0.09 Cr ₂ O ₃ trace NiO trace BaO trace SrO trace	100.23	
A2. II	.901	.164	.009	.107	.142	.158	.048	.007			.011	.001	.002			
18	49.67	18.19	0.33	12.84	2.12	9.70	2.74	0.34	0.74	0.15	2.01	0.58	0.37	CO ₂ none ZrO ₂ trace S 0.32 BaO trace	100.10	
A2. II	.828	.178	.002	.178	.053	.173	.044	.004			.025	.004	.005			
19	44.04	20.01	4.22	8.61	5.01	11.68	1.24	0.15	1.90	0.11	2.24	0.52	0.28	CO ₂ none ZrO ₂ 0.10 FeS ₂ 0.25 Cr ₂ O ₃ none V ₂ O ₅ 0.05 NiO 0.01 BaO none SrO none	100.42	
A1. I	.736	.196	.026	.119	.125	.209	.024	.002			.028	.004	.004			
20	44.54	20.72	5.84	7.30	5.56	12.67	1.49	0.24	0.54	0.38	0.40		0.17	S 0.19 BaO 0.09	100.13	
A2. II	.742	.203	.037	.101	.139	.227	.024	.003			.005		.002			
21	49.80	19.96	6.32	0.49	7.05	11.33	2.22	0.61	1.71	0.13	0.79	0.07		CO ₂ 0.15	100.63	
A2. II	.830	.195	.039	.007	.176	.201	.035	.006			.010					
22	49.88	18.55	2.06	8.37	5.77	9.72	2.59	0.68	1.04		1.19	0.16	0.09	Cl trace BaO 0.02 SrO trace	100.12	2.923
A1. I	.831	.182	.013	.117	.144	.173	.042	.007			.015	.001	.001			
23	48.29	20.87	1.13	4.93	7.54	14.32	1.77	0.38	0.89						100.12	
A2. III	.805	.204	.007	.068	.189	.255	.029	.004								

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	II(III).5.(3)4.4(5).	or 5.00 di 9.40 ab 26.20 hy 9.62 an 31.14 ol 8.85 mt 3.02 il 3.95 ap 1.01	Prospect Hill, Litchfield, Connecticut.	W. F. Hille- brand.	W. H. Hobbs, Ros. Fests. p. 37, 1906.	Hornblende diorite.	
11	"II.5.(4)5.(3)4.4.	Q 7.80 di 7.98 or 9.45 hy 8.34 ab 28.30 mt 1.16 an 36.97 il 0.91	Elizabethtown, Essex County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. B. 168, p. 37, 1900.	Pyroxenic anorthosite.	In W. T., p. 287.
12	"II.5."4.(4)5.	Q 0.60 di 9.94 or 5.00 hy 3.36 ab 33.54 mt 2.09 an 43.09 il 0.91	Whiteface Moun- tain, Adiron- dacks, New York,	G. Steiger.	J. F. Kemp, U. S. G. S. B. 168, p. 36, 1900.	Gabbro.	In W. T., p. 287.
13	II(III).5.4.4".	or 4.45 di 2.97 ab 23.06 hy 11.31 an 36.77 ol 15.62 mt 2.09 il 2.28 ap 0.34	Westport, Essex County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. A. R. 19, (III), p. 402, 1899.	Gabbro.	In W. T., p. 287.
14	II".5."4.4.	or 9.45 di 1.36 ab 22.01 hy 7.59 an 34.47 ol 13.77 mt 4.41 il 5.47 ap 1.68	Montrose Point, n. Peekskill, New York.	G. S. Rogers.	G. S. Rogers, Ann. N. Y. Ac. Sci., XXI, p. 61, 1911.	Biotite norite.	Also in A. J. S., XXXI, p. 127, 1911.
15	II.5.4.4.⊙	or 7.23 di 1.36 ab 23.58 hy 8.36 an 38.09 ol 8.51 mt 4.18 il 5.17 ap 2.35	Montrose, n. Peekskill, New York.	G. S. Rogers.	G. S. Rogers, Ann. N. Y. Ac. Sci., XXI, p. 62, 1911.	Hornblende norite.	
16	(I)II.5."4.(4)5.	Q 1.56 di 4.11 or 3.89 hy 8.23 ab 34.58 mt 1.86 an 43.09 il 0.76 ap 0.67	Lake Hopatcong quadrangle, New Jersey.	W. T. Schaller.	W. S. Bayley, U. S. G. S. B. 419, p. 29, 1910.	Augitic granite.	
17	II(III)."5."4.4(5).	Q 4.56 di 10.52 or 3.89 hy 20.77 ab 25.15 mt 2.09 an 30.30 il 1.67 ap 0.34	Bryn Mawr, n. Philadelphia, Pennsylvania.	W. F. Hille- brand.	F. Bascom, U. S. G. S. Fol. 162, p. 6, 1909.	Hypersthene gabbro.	
18	II(III).5.4."5.	Q 2.46 di 7.18 or 2.25 hy 22.19 ab 23.06 mt 0.46 an 36.14 il 3.80 ap 1.34	Fontaine, Pennsylvania.	W. T. Schaller.	F. Bascom, U. S. G. S. rec. lab.	Gabbro gneiss.	Igneous?
19	II(III).5.4(5)."5.	Q 1.20 di 5.91 or 1.11 hy 18.72 ab 12.58 mt 6.03 an 47.26 il 4.26 ap 1.34	Rising Sun, Cecil County, Maryland.	W. F. Hille- brand.	A. G. Leonard, A. G., XXVIII, p. 146, 1901.	Hornblende diorite.	In W. T., p. 293.
20	II(III).5.4(5).(4)5.	or 1.67 di 11.53 ab 12.58 hy 11.29 an 43.93 ol 3.67 mt 8.53 il 0.76	Gold Hill District, Rowan County, North Carolina.	F. B. Lanery.	F. B. Lanery, N. C. G. S. B. 21, p. 60, 1910.	Hornblende gabbro.	
21	II".5.4.4(5).	Q 3.18 di 9.50 or 3.34 hy 13.20 ab 13.34 il 1.06 an 42.81 hm 6.32 tn 0.59	Crystal Falls, Michigan.	G. Steiger.	J. M. Clements, J. G., VI, p. 381, 1898.	Hornblende gabbro.	Also in U. S. G. S. Mon. 36, p. 242, 1899. In W. T., p. 287.
22	II(III).5.4.4(5).	or 3.89 di 8.44 ab 22.01 hy 13.20 an 36.97 mt 3.02 il 2.28 ap 0.34	Pigeon Point, Minnesota.	W. F. Hille- brand.	W. S. Bayley, A. J. S., XXXVII, p. 61, 1889.	Olivine gabbro.	Also in U. S. G. S. B. 109, p. 37, 1893. In W. T., p. 287.
23	II(III).5.4".(4)5.	or 2.22 di 18.81 ab 15.20 hy 8.02 an 47.54 ol 10.72 mt 1.62	Minnesota Falls, Yellow Medicine County, Minnesota.	H. N. Stokes.	W. S. Bayley, U. S. G. S. B. 150, p. 372, 1898.	Gabbro gneiss.	In W. T., p. 287.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
24	46.45	21.30	0.81	9.57	7.90	9.83	2.14	0.34	1.02	0.14	1.19	0.02	trace	NiO 0.04	100.75	
A2. II	.774	.209	.005	.134	.195	.175	.034	.003			.015	—	—			
25	47.90	19.92	4.92	9.78	4.55	8.56	2.75	0.56	0.76		0.57			BaO none SrO none	100.39	2.93
A3. III	.798	.195	.031	.137	.114	.153	.045	.006			.007					
26	47.70	19.04	0.87	8.84	8.65	8.96	2.53	0.53	1.38		1.80		trace	BaO none SrO none	100.30	2.89
A3. III	.795	.186	.006	.123	.216	.160	.040	.005			.023		—			
27	48.68	19.29	4.07	8.31	5.52	7.78	3.49	1.16	0.16	0.10	1.70	0.05			100.31	
A2. II	.811	.189	.025	.115	.136	.139	.056	.013			.021	—				
28	47.82	18.52	6.39	3.15	8.20	11.09	1.67	0.17	1.53	0.66	0.78	0.05	0.12	CO ₂ 0.17 S 0.04 Cr ₂ O ₃ 0.03 BaO 0.02 SrO none CuO trace	100.41	2.898
A1. I	.797	.182	.040	.040	.205	.198	.027	.002			.010	—	.002			
29	49.30	19.53	3.18	6.36	5.02	7.53	2.81	2.39	2.38	0.20	1.18	0.25	0.11		100.24	
A2. II	.823	.191	.020	.089	.126	.134	.045	.026			.015	.002	.002			
30	47.44	18.21	5.37	6.05	5.53	9.98	2.58	1.17	1.08	0.13	1.38	0.68	0.06	CO ₂ none S 0.03 Cr ₂ O ₃ none NiO none BaO 0.08 SrO 0.08	99.85	
A1. I	.791	.179	.034	.084	.138	.179	.042	.013			.018	.005	.001			
31	48.49	18.35	7.63	1.21	6.72	10.40	3.02	0.57	0.67		2.19	0.20	none	SO ₃ 0.52 Li ₂ O 0.02	99.99	
A2. II	.808	.180	.048	.015	.168	.185	.048	.006			.027	.001	—			
32	47.17	17.85	7.42	1.18	6.54	10.12	2.94	0.56	0.65		2.13	0.20	none	SO ₃ 0.51 Li ₂ O 0.02 Iron 3.26	100.55	
A2. II	.786	.175	.046	.015	.166	.180	.047	.006			.025	.001	—			
33	52.09	21.35	2.26	5.82	2.57	8.17	3.28	1.81	0.53	0.57	1.47	0.61	0.18	CO ₂ trace ZrO ₂ 0.02 BaO 0.06 SrO 0.02	100.83	
A1. I	.868	.209	.014	.081	.064	.146	.053	.019			.017	.004	.003			
34	52.05	17.96	4.09	6.33	5.03	8.64	2.99	1.61	0.97			0.31	0.43		100.41	2.891
A2. II	.888	.176	.025	.088	.126	.154	.048	.017				.002	.006			
35	47.94	22.56	2.02	4.77	2.08	12.08	4.02	0.84	1.30	0.24	1.12	0.25	0.11	CO ₂ 0.16 ZrO ₂ 0.02 F 0.14 S 0.03 BaO 0.39 SrO 0.31	100.38	
A1. II	.799	.221	.013	.097	.052	.216	.065	.009			.014	.002	.002			
36	50.23	19.46	4.21	4.20	3.59	10.39	3.08	1.32	1.01	0.16	1.30	0.41	0.07	CO ₂ 0.25 S 0.02 BaO 0.04 SrO trace Li ₂ O trace	99.74	
A1. I	.837	.191	.026	.058	.090	.185	.050	.014			.016	.003	.001			
37	51.08	19.77	trace	3.60	4.57	16.03	2.56	0.28	0.65	0.15	0.45	0.14	0.09	CO ₂ 0.32 BaO trace SrO trace	99.69	
A2. II	.851	.194	—	.050	.114	.286	.041	.003			.006	.001	.001			
38	49.41	18.08	5.93	4.08	4.61	10.10	3.48	1.01	1.59	0.04	0.95		0.09		99.37	
A2. II	.824	.157	.037	.057	.115	.180	.056	.011			.012		.001		(99.77)	

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSESE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name..	Remarks.
24	II''5.4''5.	or 1.67 di 0.68 ab 17.82 hy 10.62 an 47.82 ol 17.51 mt 1.16 il 2.28	St. Louis County, Minnesota.	H. N. Stokes.	W. S. Bayley, J. G., I, p. 712, 1893.	Gabbro.	In W. T., p. 287.
25	II''5.4.(4)5.	or 3.34 di 2.07 ab 23.58 hy 19.30 an 40.03 ol 3.06 mt 7.19 il 1.06	Birch Lake, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 374, 1900.	Diabase.	Incorrect on p. 184, op. cit. In W. T., p. 287.
26	II(III).5.4.(4)5.	or 2.78 di 4.29 ab 20.96 hy 13.05 an 39.20 ol 13.70 mt 1.39 il 3.50	Birch Lake, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 181, 1900.	Olivine gabbro.	In W. T., p. 289.
27	II.5.(3)4.4.	or 7.23 di 4.23 ab 29.34 hy 7.97 an 32.26 ol 9.20 mt 5.80 il 3.19	Taylor's Falls, Minnesota.	C. A. Taylor.	F. F. Grout, J. G., XVIII, p. 647, 1910.	Diabase.	
28	II(III)''5.4''5.	Q 4.02 di 9.72 or 1.11 hy 16.00 ab 14.15 mt 6.96 an 42.45 il 1.52 hm 1.60	Tamarack Falls, Pine County, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 644, 1910.	Diabase.	
29	II.5.(3)4.(3)4.	or 14.46 di 1.57 ab 23.58 hy 12.19 an 33.36 ol 3.12 mt 4.64 il 2.28 ap 0.67	Mount Devon, Missouri.	W. F. Hille- brand.	A. Johannsen, pers. com.	Devonite (diabase porphyry).	Anal. E. in U. S. G. S. B. 419, p. 40, is of groundmass. Cf. p. 871.
30	II(III).5.4.4.	Q 0.12 di 8.00 or 7.23 hy 14.33 ab 22.01 mt 7.89 an 35.03 il 2.74 ap 1.68	Black Butte, Elkhorn District, Montana.	H. N. Stokes.	J. S. Barrell, U. S. G. S. A. R. 22, (II), p. 514, 1901.	Gabbro.	
31	II(III).5.4.(4)5.	Q 0.48 di 9.50 or 3.34 hy 12.40 ab 25.15 il 2.28 an 35.03 hm 7.63 tn 2.35 ap 0.34	Prospect Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (2), p. 438, 1899.	Basalt.	Calculated to 100, as free from 3.26 metallic Fe. Cf. No. 32. In W. T., p. 289.
32	II(III).5.4.(4)5.	Q 0.18 di 9.72 or 3.34 hy 12.10 ab 24.63 il 2.28 an 33.92 hm 7.42 tn 1.96 ap 0.34 Fe 3.26	Prospect Peak, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. B. 148, p. 135, 1897.	Basalt.	Cf. preceding. In W. T., p. 333.
33	II.5.(3)4.4.	Q 3.18 hy 13.40 or 10.56 mt 3.45 ab 27.77 il 2.58 an 36.97 ap 1.34 C 0.41	Trout Creek, San Cristobal quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. rec. lab.	Diorite porphyry.	
34	II.5.4''4.	Q 0.96 di 6.12 or 9.45 hy 18.72 ab 25.15 mt 5.80 an 33.36 ap 0.67	Stony Mountain, Ouray County, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. Fol. 57, p. 7, 1899.	Gabbro.	In W. T., p. 289.
35	II.5''4.4''.	or 5.00 di 15.43 ab 22.53 ol 2.27 an 40.87 mt 3.02 ne 6.25 il 2.13 ap 0.67	Beaver Creek, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Nephelite gabbro.	
36	II.5''4.4.	Q 2.52 di 10.63 or 7.78 hy 6.19 ab 26.20 mt 6.03 an 35.31 il 2.43 ap 1.01	Yentna River, n. Hayes River, Alaska.	H. N. Stokes.	J. E. Spurr, A. G., XXV, p. 233, 1900.	Augite belugite.	In W. T., p. 289.
37	II''5.4''5.	or 1.67 di 29.95 ab 21.48 ol 0.80 an 41.70 il 0.91 ap 0.34	Hedley District, British Columbia.	M. F. Connor.	C. Camsell, Can. G. S. Mem. 2, p. 83, 1910.	Gabbro.	
38	II.5.(3)4.4''.	or 6.12 di 13.09 ab 29.34 hy 6.13 an 33.36 ol 0.31 mt 8.58 il 1.82	Olivine Mountain, Tulameen District, British Columbia.	M. F. Connor.	C. Camsell, Can. G. S. rec. lab.	Gabbro.	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
39	47.76	18.58	2.19	9.39	4.15	9.39	3.61	0.47	0.53	0.12	2.20	0.78	0.29	BaO 0.02 SrO 0.03	99.51	2.957
A2. II	.796	.182	.014	.131	.104	.168	.058	.005			.028	.005	.004			
40	51.98	15.99	3.10	5.88	5.09	9.68	2.71	0.81	2.08	0.48	1.71	0.31	0.10	S Cr ₂ O ₃ 0.01 NiO none BaO none SrO 0.03 none	99.96	
A1. I	.867	.157	.019	.082	.127	.173	.043	.009			.021	.002	.001			
41	58.25	20.52	0.68	3.88	2.03	7.88	4.25	0.50	1.10	0.24	0.57	0.16	0.10	CO ₂ none ZrO ₂ 0.01 S none BaO none SrO none	100.17	
A1. I	.971	.201	.004	.054	.051	.141	.069	.005			.007	.001	.001			
42	55.53	17.63	2.81	3.59	5.85	8.74	3.09	0.92	1.24		0.56	0.21	0.08	BaO 0.02 SrO 0.06 Li ₂ O none	100.33	
A1. I	.926	.173	.017	.050	.146	.158	.050	.010			.007	.001	.001			
43	53.91	17.95	2.21	4.80	5.52	10.40	2.90	1.34	0.20	0.20	0.52	0.21	0.10	BaO 0.05 SrO trace Li ₂ O trace	100.31	
A2. II	.899	.176	.014	.067	.138	.185	.047	.015			.007	.001	.001			
44	52.81	16.60	2.66	6.13	6.12	10.14	2.79	1.05	0.54	0.38	0.84	0.23		BaO 0.03 SrO trace Li ₂ O trace	100.32	
A2. II	.880	.163	.017	.085	.153	.181	.045	.011			.011	.002				
45	51.21	17.59	4.71	4.42	7.12	10.36	2.49	0.91	1.07	0.58	0.31	0.09	trace	BaO none Li ₂ O none	100.86	
A2. II	.854	.172	.029	.041	.178	.185	.040	.010			.004	—	—			
46	55.14	19.10	6.16	0.54	4.23	8.36	3.71	1.04	0.91		0.52	0.18	0.11	BaO trace SrO 0.07 Li ₂ O trace	100.07	
A2. II	.919	.187	.039	.007	.106	.150	.059	.001			.007	.001	.002			
47	53.85	18.53	1.96	5.30	5.88	9.66	2.98	0.74	0.45		0.50	0.05	0.12	Cr ₂ O ₃ trace BaO 0.03 SrO 0.04 Li ₂ O trace	100.09	
A1. I	.998	.181	.012	.074	.147	.172	.048	.008			.006	—	.002			
48	53.35	19.22	3.28	4.48	4.86	9.76	2.89	0.99	0.77		0.56	0.10	0.15	BaO trace SrO 0.03 Li ₂ O trace	100.44	
A2. II	.889	.188	.021	.063	.122	.174	.047	.011			.007	.001	.002			
49	52.95	18.25	4.36	4.19	4.93	8.73	3.57	0.77	1.47		0.66	trace	0.12	SO ₃ trace BaO 0.01 SrO trace	100.01	
A2. II	.883	.179	.027	.058	.123	.155	.058	.008			.008	—	.002			
50	52.65	17.81	2.08	6.35	5.35	9.03	2.85	0.50	3.08	0.21				CO ₂ trace	99.91	
A3. III	.878	.175	.013	.089	.134	.161	.046	.005								
51	47.94	18.90	2.21	8.59	8.21	9.86	2.81	0.29	0.74	0.39	0.57	0.15	trace	BaO none SrO none Li ₂ O trace	100.66	
A2. II	.799	.185	.014	.120	.205	.176	.045	.003			.007	.001	—			
52	50.77	19.40	4.43	5.59	5.25	9.81	2.64	0.30	0.41	1.30	0.28	0.18			100.36	2.79
A2. II	.846	.190	.028	.078	.131	.175	.042	.003			.004	.001				
53	47.27	20.82	1.85	4.26	6.44	13.02	2.75	0.22	1.27	0.08	0.92	0.74	trace	CO ₂ none Cl trace FeS ₂ 0.20 Cr ₂ O ₃ trace V ₂ O ₅ 0.02 NiO none BaO none SrO trace	99.86	
A1. I	.788	.204	.012	.059	.161	.232	.045	.002			.012	.005	—			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSESE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
39	II''5.(3)4''5.	or 2.78 di 7.39 ab 30.39 hy 7.72 an 33.08 ol 8.33 mt 3.25 il 4.26 ap 1.67	Ashnola River, Okanagan range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 435, 1912.	Gabbro.	
40	II(III).(4)5''4.4''.	Q 6.84 di 13.66 or 5.60 hy 11.80 ab 22.53 mt 4.41 an 29.19 il 3.19 ap 0.67	Camas Land, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, U. S. G. S. Fol. 106, p. 6, 1904.	Gabbro.	In W. T., p. 289.
41	(I)II.(4)5.(3)4''5.	Q 10.02 di 2.54 or 2.78 hy 9.65 ab 36.15 mt 0.93 an 35.31 il 1.12 ap 0.34	Riddles quad- rangle, Oregon.	G. Steiger.	G. F. Kay, U. S. G. S. B. 419, p. 167, 1910.	Granodiorite.	
42	II.(4)5.(3)4.4''.	Q 7.50 di 9.29 or 5.56 hy 13.74 ab 26.20 mt 3.94 an 31.41 il 1.06 ap 0.34	Butte Mountain, Plumas County, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 195, 1897.	Pyroxene andesite.	In W. T., p. 289.
43	II''5.(3)4.4.	Q 2.76 di 15.23 or 8.34 hy 12.66 ab 24.63 mt 3.25 an 31.69 il 1.06 ap 0.34	Mount Ingalls, Plumas County, California.	W. F. Hille- brand.	H. W. Turner, A. J. S., XLIV, p. 458, 1892.	Basalt.	Also in U. S. G. S. A. R. 14 (II), p. 492, 1894. In W. T., p. 289.
44	II(III).5.(3)4.4.	Q 3.18 di 15.05 or 6.12 hy 15.55 ab 23.58 mt 3.94 an 29.75 il 1.67 ap 0.67	Mount Ingalls, Plumas County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 14, (II), p. 492, 1894.	Basalt.	In W. T., p. 289.
45	II(III).5.4.4.	Q 2.46 di 13.90 or 5.56 hy 14.91 ab 20.96 mt 6.73 an 33.92 il 0.61	Franklin Hill, Plumas County, California.	G. Steiger.	H. W. Turner, U. S. G. S. A. R. 17, (I), p. 734, 1896.	Basalt.	In W. T., p. 289.
46	II.(4)5.(3)4.4''.	Q 7.74 di 6.48 or 6.12 hy 7.60 ab 30.92 mt 0.46 an 32.53 il 1.06 hm 5.92 ap 0.34	Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 150, p. 218, 1898.	Secretion in dacite.	Cf. No. 92, I.4.2.4. In W. T., p. 289.
47	II''5.4.4(5).	Q 3.60 di 10.57 or 4.45 hy 17.24 ab 25.15 mt 2.78 an 34.75 il 0.91	Crater Peak, n. Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 197, 1897.	Hypersthene andesite.	Secretion in No. 76, II.4.3.4. In W. T., p. 289.
48	II''5.4.4.	Q 4.80 di 9.18 or 6.12 hy 12.80 ab 24.63 mt 4.64 an 36.14 il 1.06 ap 0.34	Chaos, Lassen Peak, California.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. B. 148, p. 194, 1897.	Secretion in dacite.	Cf. No. 91, I.4.2.4. In W. T., p. 289.
49	II''5''4''5.	Q 4.26 di 9.29 or 4.45 hy 11.18 ab 30.39 mt 6.26 an 31.41 il 1.22	Crater Peak, n. Lassen Peak, California.	R. B. Riggs.	J. S. Diller, U. S. G. S. B. 148, p. 200, 1897.	Basalt.	In W. T., p. 289.
50	II''''5.4.(4)5.	Q 4.62 di 8.44 or 2.78 hy 19.28 ab 24.10 mt 3.02 an 34.47	Butcher Creek, Shasta County, California.	R. C. Wells.	B. S. Butler, U. S. G. S. B. 419, p. 138, 1910.	Diabase.	
51	II(III).5.4.5.	or 1.67 di 8.16 ab 23.53 hy 6.84 an 38.09 ol 16.56 mt 3.25 il 1.06 ap 0.34	McCloud River, n. Mount Shasta, California.	H. N. Stokes.	J. S. Diller, U. S. G. S. B. 148, p. 190, 1897.	Basalt.	In W. T., p. 289.
52	II''5.4''5.	Q 4.92 di 6.05 or 1.69 hy 16.25 ab 22.01 mt 6.50 an 40.31 il 0.61 ap 0.34	Pie Knob, Berkeley Hills, California.	Blasdale.	Lawson and Palache, Un. Cal. Dep. G. B., II, p. 434, 1901.	Basalt.	
53	II.5.4.5.○	or 1.12 di 13.09 ab 23.58 hy 1.16 an 43.65 ol 9.52 mt 2.78 il 1.82 ap 1.68	Beaver Creek, Tuolumne County, California.	H. N. Stokes.	H. W. Turner, A. J. S., VII, p. 297, 1899.	Gabbro.	In W. T., p. 291.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
54	50.38	19.83	6.05	2.00	5.36	10.03	2.15	1.76	1.37		none	none	0.38	SO ₃ 0.83 Li ₂ O trace		
A2. II	.840	.194	.038	.028	.134	.178	.033	.019			—	—	.005			
55	47.09	18.40	2.66	5.62	7.06	10.19	2.37	1.34	2.37	0.66	1.19	0.54	none	CO ₂ none S 0.03 BaO 0.17	99.69	
A2. II	.785	.180	.017	.078	.177	.182	.039	.014			.015	.004	—			
56	52.63	19.95	3.26	4.26	6.95	8.31	2.80	0.89	0.43	0.08	1.13	none		S trace	100.69	
A2. II	.877	.195	.020	.059	.174	.148	.045	.010			.014	—				
57	52.39	18.10	0.51	7.43	7.46	8.22	3.45	0.86	0.57	0.10	1.36	none		S trace	100.45	
A2. II	.873	.177	.003	.103	.162	.146	.056	.009			.017	—				
58	51.57	18.74	2.23	7.27	7.02	8.58	2.95	0.84	0.33	0.62	0.92	none		S trace	100.57	
A2. II	.860	.184	.014	.101	.176	.154	.048	.009			.012	—				
59	48.03	20.98	7.06	4.51	4.43	9.54	3.28	1.99	0.40	0.21					100.43	
A3. III	.801	2.06	.044	.063	.111	.170	.053	.021							(100.49)	
60	51.04	17.34	2.88	7.33	5.50	9.79	2.88	0.53	0.72	0.96	1.32	0.25	0.13	CO ₂ none	100.67	
A2. II	.851	.170	.018	.101	.135	.175	.047	.006			.017	.002	.002			
61	48.94	18.77	4.89	4.77	1.59	11.50	2.13	1.14	1.46	2.32	1.34	0.28	0.83		99.96	
A2. II	.816	.184	.031	.067	.040	.205	.034	.012			.017	.002	.012			
62	57.10	16.24	2.45	3.76	7.49	9.65	2.74	1.11	n. d.		0.52	0.08			100.92	
A2. III	.952	.159	.015	.052	.187	.172	.044	.012			.007	—				
63	47.51	20.80	4.30	5.31	8.18	10.70	1.65	0.30	0.25		0.71	trace			99.71	
A3. III	.792	.027	.027	.074	.205	.191	.027	.003			.009	—				
64	47.15	22.30	2.22	6.93	5.15	12.30	1.81	0.35	1.00		0.90	0.19			100.30	
A2. II	.786	.219	.014	.096	.129	.220	.029	.004			.012	.001			(100.11)	
65	46.60	22.30	4.56	4.89	6.39	11.50	2.17	0.38	0.69		1.15				100.63	
A3. III	.777	.218	.029	.068	.160	.205	.035	.004			.014					
66	56.71	18.80	3.12	5.35	3.62	8.06	3.65	0.77	0.11		0.77	0.08			100.95	
B2. III	.945	.184	.019	.075	.091	.144	.059	.008			.010	—				
67	53.51	18.90	3.37	5.70	4.38	9.15	3.13	0.51	0.12		1.06				99.79	
A3. III	.892	.185	.021	.079	.110	.164	.050	.005			.013					
68	47.15	22.30	2.22	6.93	5.15	12.30	1.81	0.35	1.00		0.90	0.19			100.30	
A2. II	.786	.219	.014	.096	.129	.220	.029	.004			.012	.001			(100.20)	

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
54	II.5.4.(3)4.	Q 4.44 di 7.78 or 10.56 hy 9.80 ab 17.29 mt 7.66 an 39.48 pr 0.90	Richmond Mountain, Eureka District, Nevada.	J. E. Whitfield.	Hague and Iddings, U. S. G. S. Mon. 20, p. 264, 1892.	Basalt.	In W. T., p. 291.
55	II''5.4.4.	or 7.78 di 9.33 ab 20.44 hy 8.21 an 35.31 ol 7.98 mt 3.94 il 2.28 ap 1.34	Crater, Silver Peak, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 55, p. 28, 1906.	Basalt.	
56	II.5.4.4''.	Q 3.60 di 1.76 or 5.58 hy 19.86 ab 23.58 mt 4.64 an 38.92 il 2.13	Volcancito, Jorullo, Mexico.	F. Roel.	E. Ordenez, Cong. G. Int. X, Guide XI, p. 55, 1906.	Basalt.	
57	II''5.(3)4.4(5).	or 5.00 di 7.72 ab 29.34 hy 18.92 an 31.14 ol 3.25 mt 0.70 il 2.58	Malpais, Jorullo, Mexico.	F. Roel.	E. Ordenez, Cong. G. Int. X, Guide XI, p. 55, 1906.	Basalt.	
58	II(III).5.4.4''.	or 5.00 di 6.09 ab 25.15 hy 21.49 an 35.31 ol 2.22 mt 3.25 il 1.82	Malpais, Jorullo, Mexico.	F. Roel.	E. Ordenez, Cong. G. Int. X, Guide XI, p. 55, 1906.	Basalt.	
59	II.5.''4.''4.	or 11.68 di 8.59 ab 24.10 ol 6.66 an 36.70 mt 10.21 ne 1.99	San José, Tamaulipas, Mexico.	G. I. Finlay.	G. I. Finlay, Ann. N. Y. Ac. Sci., XIV, p. 278, 1904.	Basalt.	
60	II(III).5.''4.(4)5	Q 2.70 di 11.56 or 3.34 hy 16.83 ab 24.63 mt 4.18 an 32.53 il 2.58 ap 0.67	Gold Hill, Canal Zone, Panama.	G. Steiger.	D. F. McDonald, U. S. G. S. rec. lab.	Lava.	
61	II.(4)5.4.4.	Q 7.98 di 13.79 or* 6.67 hy 1.26 ab 17.82 mt 7.19 an 38.36 il 2.58 ap 0.67	Empire, Canal Zone, Panama.	C. Palmer.	D. F. McDonald, U. S. G. S. rec. lab.	Andesite.	
62	II(III).(4)5.(3)4.4.	Q 7.44 di 15.19 or 6.67 hy 15.47 ab 23.06 mt 3.48 an 28.63 il 1.06	Pointe Burgos, Martinique, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Quartz basalt.	
63	II(III).5.4(5)''5.	Q 0.24 di 3.77 or 1.67 hy 23.72 ab 14.15 mt 6.26 an 48.37 il 1.37	Ilot des Ramiers, Martinique, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Basalt.	
64	II.5.4(5).(4)5.	or 2.22 di 7.72 ab 15.20 hy 14.51 an 51.71 ol 2.83 mt 3.25 il 1.82	Rivière Claire, Mont Pelée, Martinique, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 543, 1904.	Hornblende norite.	Locality? Same analysis as No. 68, below.
65	II.5.4''.(4)5.	or 2.22 di 5.72 ab 18.34 hy 11.18 an 49.76 ol 3.86 mt 6.73 il 2.13	La Calabasse, Mont Pelée, Martinique, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 543, 1904.	Norite.	Inclusion in andesite.
66	II.(4)5.(3)4.(4)5.	Q 8.70 di 6.12 or 4.45 hy 12.18 ab 30.92 mt 4.41 an 32.53 il 1.52	Eruption of 1902, La Soufrière, St. Vincent, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 598, 1904.	Andesite.	
67	II.(4)5.4.''5.	Q 6.78 di 7.66 or 2.78 hy 13.22 ab 26.20 mt 4.87 an 36.14 il 1.98	Old Sommaof, La Soufrière, St. Vincent, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 598, 1904.	Hypersthene labradorite (basalt).	
68	II.5.4(5).(4)5.	or 2.22 di 7.72 ab 15.20 hy 14.51 an 51.71 ol 2.83 mt 3.25 il 1.82	Chateaubelair, St. Vincent, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 598, 1904.	Diorite.	Inclusion in andesite. Locality? Same analysis as No. 64, above.

CLASS II. DOSALANE—Continued.

RANG. 4. DOALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
69	52.81	18.79	3.28	4.58	5.19	9.58	3.23	0.60	0.17	0.20	0.95	0.15	0.28	SO ₃ 0.33 Cl 0.14 NiO 0.07	100.35	
A2. II	.880	.184	.021	.064	.130	.171	.052	.006			.012	.001	.004			
70	51.85	21.00	3.95	5.07	3.14	9.68	2.60	0.70	0.50		0.96	0.06			99.83	
A2. II	.864	.206	.025	.070	.079	.173	.042	.007			.012	—				
71	52.92	16.66	4.76	4.89	7.96	5.71	5.12	0.89	0.80			0.78			100.49	2.858
A3. III	.882	.164	.030	.068	.199	.102	.082	.010				.006				
72	47.64	19.98	4.83	7.26	7.14	9.62	1.23	1.03	0.12		1.20			CO ₂ 0.28	100.43	2.979
A3. III	.794	.195	.030	.101	.179	.171	.020	.011			.015					
73	52.8	17.8	1.2	4.8	4.8	12.9	3.0	0.5	1.2						99.5	2.91
B3. IV	.880	.174	.007	.067	.120	.230	.048	.005								
74	47.28	21.07	3.52	3.91	8.06	13.42	1.52	0.29	0.53	0.13	0.28	trace	0.15	Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.02	100.20	2.90
A2. II	.788	.207	.022	.064	.202	.239	.024	.003			.004	—	.002			
75	49.80	17.77	2.29	8.75	5.67	8.85	1.48	0.48	2.62	1.04	1.56	trace			100.31	2.932
A3. III	.830	.174	.014	.122	.142	.158	.024	.005			.020	—				
76	48.34	20.10	1.97	6.62	5.49	13.16	1.66	0.98	0.44	0.02	0.95	0.04	0.32	CO ₂ 0.11 S none NiO none BaO 0.10	100.30	
A1. I	.806	.197	.012	.092	.137	.235	.027	.010			.012	—	.005			
77	45.54	23.39	1.98	6.98	4.60	11.82	2.50	0.44	0.72	0.62	1.06	0.13	0.27	S none NiO none BaO none	100.05	
A1. I	.756	.229	.013	.097	.115	.211	.040	.005			.013	.001	.004			
78	50.69	20.56	1.55	3.10	6.84	11.99	3.36	none	0.94	0.18	0.42	0.05	0.16	CO ₂ none FeS ₂ 0.11 Cr ₂ O ₃ 0.08 V ₂ O ₅ 0.02 NiO none BaO none Li ₂ O trace	100.05	
A1. I	.845	.201	.010	.043	.171	.214	.054	—			.005	—	.002			
79	49.24	21.70	1.02	5.40	5.56	9.70	2.12	1.82	2.95		0.41				99.92	
A3. III	.821	.213	.006	.075	.139	.173	.034	.019			.005					
80	49.45	20.41	1.34	9.51	5.34	9.96	2.73	0.20	0.70		0.32				99.96	
A3. III	.824	.200	.008	.133	.134	.178	.043	.002			.004					
81	49.30	21.60	2.28	7.26	7.82	10.20	2.15	0.29	0.10						101.00	2.97
B3. IV	.822	.212	.014	.101	.196	.182	.035	.003								
82	56.51	17.90	0.08	5.72	5.58	8.64	2.72	0.82	0.50		0.86	0.15			99.48	
A2. II	.942	.175	.001	.079	.140	.154	.044	.009			.011	.001				
83	46.60	18.90	1.98	8.21	6.41	8.52	2.50	1.69	3.10		1.80	0.30			100.01	
A2. II	.777	.185	.013	.114	.160	.152	.040	.018			.023	.002				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSESE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
69	II.'5.'4.(4)5.	Q 4.62 di 9.36 or 3.34 hy 12.72 ab 27.25 mt 4.87 an 35.03 il 1.82 ap 0.34	Eruption of 1902. St. Vincent, West Indies.	W. Pollard.	J. S. Flett, Q. J. G. S., LVIII, p. 369, 1902.	Volcanic ash (andesite?).	Collected at Barbados.
70	II.(4)5.4.4(5).	Q 7.68 di 3.62 or 3.89 hy 10.60 ab 22.01 mt 5.80 an 43.65 il 1.82	Vallée de Houel- mont, Guade- loupe, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 588, 1904.	Basalt.	
71	II''5.4.(4)5.	or 5.56 di 2.22 ab 42.97 hy 11.04 an 20.02 ol 9.15 mt 6.96 ap 2.02	Panango Hondon, Ruminahui Volcano, Ecuador.	A. Young.	A. Young, Hochg. Ecuad., II (2), p. 243, 1902.	Basalt.	
72	II(III).5.4''(3)4.	Q 2.28 di 1.57 or 6.12 hy 24.53 ab 10.48 mt 6.96 an 45.59 il 2.28	Förväxlings Point, Spitzbergen.	H. Backlund.	H. Backlund, Ref. N. J., 1911, II, p. 243.	Diabase.	
73	II(III).5.4.(4)5.	Q 2.22 di 24.63 or 2.78 hy 7.14 ab 25.15 mt 1.62 an 33.64 il 0.91	Druim am Eidlne, Skye, Scotland.	J. H. Playser.	Geikie and Teall, Q. J. G. S., L, p. 653, 1894.	Gabbro.	Light band. Cf. No. 61, IV.2.1.2.3. In W. T., p. 291.
74	II(III).5.4(5).(4)5.	or 1.67 di 13.00 ab 12.58 hy 12.81 an 50.04 ol 3.69 mt 5.10 il 0.61	Coir' a Mahadaidh, Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, pp. 103, 249, 1904.	Olivine gabbro	
75	II(III).(4)5.4''4.	Q 7.38 di 2.97 or 2.73 hy 24.36 ab 12.58 mt 3.25 an 40.31 il 3.04	Auchinstarry, Kilsyth, Dumbartonshire, Scotland.	D. P. Macdon- ald.	G. W. Tyrrell, G. Mag. (V), VI, p. 361, 1909.	Diabase.	
76	II(III).5.4.4.	or 5.56 di 17.03 ab 14.15 hy 10.32 an 44.48 ol 4.25 mt 2.78 il 1.82	Leac an Leathaird, Mull, Scotland.	E. G. Radley.	G. S. G. B., Sum. Prog. (1912), p. 69, 1913.	Gabbro.	
77	II.5.4.(4)5.	or 2.73 di 7.76 ab 17.82 ol 12.90 an 51.15 mt 3.02 ne 1.70 il 1.98 ap 0.34	Coire Buidhe, Mull, Scotland.	E. G. Radley.	G. S. G. B., Sum. Prog. (1912), p. 70, 1913.	Olivine dolerite.	
78	II.5.4.5.⊙	ab 23.30 di 14.79 an 40.87 hy 5.46 ol 6.12 mt 2.32 il 0.76	Polcoverack, Coverack, Cornwall.	E. G. Radley.	Flett and Hill, G. S. Eng., sheet 359, p. 100, 1912.	Olivine gabbro.	
79	II.5.4.(3)4.	or 10.58 di 2.94 ab 17.82 hy 13.65 an 44.45 ol 5.29 mt 1.39 il 0.76	La Germionniere, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 132, 1913.	Quartz diorite.	
80	II''5.4.5.	or 1.11 di 5.32 ab 22.53 hy 18.53 an 43.09 ol 5.92 mt 1.86 il 0.61	La Morandiere, Pallet, Loire Inferieure, France.	Pisani.	A. Lacroix, B. Sv. Ct. G. Fr., LXVII, p. 23, 1899.	Gabbro.	In W. T., p. 291.
81	II''5.4''.'5.	or 1.67 di 1.85 ab 18.34 hy 20.32 an 48.37 ol 7.16 mt 3.25	Bois, Pallet, Loire Inferieure, France.	Pisani.	A. Lacroix, B. Sv. Ct. G. Fr., LXVII, p. 23, 1899.	Gabbro.	In W. T., p. 291.
82	II.(4)5.4.4''.	Q 8.64 di 6.65 or 5.00 hy 19.66 ab 23.06 mt 0.23 an 33.92 il 1.67 ap 0.34	Riou Maou, Pyrenees, France.	Pisani.	A. de Romeu, B. Soc. Min. Fr., XXX, p. 137, 1907.	Hornblende labradorite (basalt).	
83	II''5.'4.4.	or 10.01 di 4.08 ab 20.96 hy 6.41 an 35.31 ol 13.04 mt 3.02 il 3.50 ap 0.67	L'Arbizon, Pyrenees, France.	Pisani.	A. de Romeu, B. Soc. Min. Fr., XXX, p. 179, 1907.	Diabase.	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
84	49.68	20.86	1.02	5.52	6.50	10.77	3.46	1.38	0.53		0.23	none		S 0.26	100.21	
A2. II	.828	.205	.006	.076	.162	.193	.056	.015			.003	—				
85	50.46	20.08	2.00	5.56	6.27	10.33	3.56	0.68	0.54		0.60	0.12	0.10	S 0.03	100.33	2.90
A2. II	.861	.197	.013	.077	.157	.184	.057	.007			.008	.001	.001			
86	48.80	22.08	3.20	5.28	1.65	10.73	2.11	1.04	1.25	0.15	2.40	0.70	0.14	ZrO ₂ 0.15 S 0.17	99.85	
A2. II	.813	.217	.020	.074	.041	.191	.034	.001			.030	.005	.002			
87	45.85	18.43	1.76	11.60	4.67	8.73	3.24	1.34	0.81	0.22	1.98	0.68	0.22	S 0.07	99.60	
A2. II	.764	.181	.011	.161	.117	.155	.052	.014			.025	.005	.003			
88	50.50	21.07	1.85	3.62	5.26	13.20	2.09	0.36	0.92	none	0.29	0.36		CO ₂ 0.32 SO ₂ 0.33	100.17	
A2. II	.842	.206	.012	.050	.132	.236	.034	.004			.004	.003				
89	52.44	19.55	2.41	5.68	3.27	8.51	2.73	2.23	1.18	0.28	1.08	0.31		CO ₂ 0.17	99.84	
A2. II	.874	.193	.015	.079	.082	.152	.044	.023			.014	.002				
90	49.93	18.94	2.73	4.45	6.51	10.06	3.53	1.04	1.30	0.08	0.82	0.22		CO ₂ 0.22 SO ₂ 0.26	100.09	
A2. II	.832	.185	.017	.062	.163	.180	.056	.011			.010	.002				
91	47.97	22.16	1.12	4.10	4.58	11.96	3.23	0.29	2.05	0.15	0.44	1.14		FeS ₂ 0.35	99.54	
A2. II	.800	.217	.007	.057	.115	.214	.052	.003			.006	.008				
92	46.50	18.60	9.50	4.31	5.55	9.61	1.76	1.01	2.11		1.01	0.87			100.83	
A2. II	.775	.182	.059	.060	.139	.171	.028	.011			.013	.006				
93	45.09	19.23	4.20	9.86	4.76	10.43	2.86	0.39	0.78	none	1.92	0.56		FeS ₂ 0.66	100.74	
A2. II	.752	.189	.026	.137	.119	.186	.046	.004			.024	.004				
94	53.14	16.57	2.11	7.39	6.11	8.92	2.94	1.07	1.02		1.05	0.17		SO ₂ 0.27	100.76	2.902
A2. II	.886	.162	.013	.103	.153	.159	.047	.012			.013	.001				
95	52.38	16.59	1.80	4.44	4.90	12.02	3.52	0.38	1.43	0.21	1.70	0.11	0.03		99.51	2.931
A2. II	.873	.163	.011	.062	.123	.214	.056	.004			.021	.001	—			
96	51.88	20.40	0.79	4.04	3.42	12.23	3.65	0.31	1.66		1.09	0.06	0.09		99.62	2.763
A2. II	.865	.200	.005	.056	.086	.218	.059	.003			.014	—	.001			
97	51.38	23.97	1.42	3.84	2.52	12.85	2.70	0.20	1.14		0.60				100.62	
A3. III	.856	.235	.009	.053	.063	.230	.044	.002			.008					
98	47.41	20.40	3.35	7.24	7.53	9.70	2.14	0.42	1.20		1.11				100.50	
A3. III	.790	.200	.021	.101	.188	.173	.034	.004			.014					

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
84	II.5''(3)4.4.	or 8.34 di 13.28 ab 20.44 ol 13.50 an 37.25 mt 1.59 ne 4.83 il 0.46	Saebø, Radø, n. Bergen, Norway.	Lillejord.	C. F. Kolderup, Berg. Mus. Aarb., XII, p. 36, 1903.	Labradorfels (anorthosite).	
85	II.5''4.(4)5.	or 3.89 di 10.79 ab 23.87 hy 6.84 an 36.97 ol 8.00 mt 3.02 il 1.22 ap 0.34	Rantasjoki, Kiruna District, Lapland, Sweden.	G. Nyblom.	H. Lundbohm, G. F. F., XXXII, p. 787, 1910.	Diabase.	
86	II.(4)5.4.4.	Q 7.80 di 0.46 or 6.12 hy 7.30 ab 17.82 mt 4.64 an 47.82 il 4.56 ap 1.68	Västra Värnsingen, Nordingra Region, Sweden.	M. Wunder.	J. E. Sobral, G. Nord. Reg., p. 106, 1913.	Anorthosite.	
87	II''5.(3)4.4.	or 7.78 di 5.35 ab 24.63 ol 19.25 an 31.97 mt 2.55 ne 1.42 il 3.80 ap 1.68	Svartsbergvik, Nordingra Region, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 133, 1913	Olivine diabase.	
88	II.5.4''(4)5.	Q 3.24 di 12.91 or 2.22 hy 11.50 ab 17.82 mt 2.78 an 46.70 il 0.61 ap 1.01	Seeheimer Bruch, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 12, 1906.	Gabbro.	
89	II.5''4.''4.	Q 4.14 di 4.32 or 12.79 hy 12.68 ab 22.53 mt 3.48 an 35.03 il 2.13 ap 0.67	Hundsruick, n. Rossdorf, Hesse.	K. M. Jene.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 24, 1912.	Diabase.	
90	II.5''4.4''.	or 6.12 di 12.23 ab 29.34 hy 2.63 an 32.80 ol 8.90 mt 3.94 il 1.52 ap 0.67	Traisa, Blatt Rossdorf, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 34, 1912.	Diorite.	
91	II.5.4.5.○	or 1.67 di 5.62 ab 27.25 hy 3.59 an 45.04 ol 9.94 mt 1.62 il 0.91 ap 2.69	Breitelohe, Hesse.	W. Sonne.	C. Chelius, Nb. Ver. Erdk. (4), XVIII, p. 24, 1897.	Gabbro.	In W. T., p. 291.
92	II''(4)5.4.4.	Q 6.48 di 1.73 or 6.12 hy 13.10 ab 14.67 mt 10.90 il 1.98 hm 1.92 ap 2.02	Frielendorf, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 6.	Basalt.	
93	II(III).5.4.''4.	or 2.22 di 7.79 ab 24.10 hy 4.78 an 38.64 ol 10.86 mt 6.03 il 3.65 ap 1.34	Buch, n. Lindenfels, Hesse.	Surv. lab.	C. Chelius, Erl. G. Kt. Hes., Bl. Lindenfels, p. 35, 1901.	Diorite pegmatite.	
94	II(III).5.(3)4.4.	Q 2.58 di 12.03 or 6.67 hy 19.59 ab 24.63 mt 3.02 an 28.63 il 1.93 ap 0.34	Ferdinandstal, Brocken, Harz.	Hesse.	O. H. Erdmanns- doerfer, Jb. Pr. G. L.-A., XXVII, p. 361, 1906.	Diorite.	
95	II(III).5.(3)4.''5.	Q 2.76 di 24.00 or 2.22 hy 4.79 ab 29.34 mt 2.55 an 28.63 il 3.19 ap 0.34	Neurode, Silesia.	A. Lindner.	F. Tannhäuser, Sb. Pr. Ak. Wiss., 1907, II, p. 845.	Diabase.	
96	II.5.4.5.○	Q 0.78 di 18.08 or 1.67 hy 4.88 ab 30.92 mt 1.16 an 38.36 il 2.13	Neurode, Silesia.	A. Lindner.	F. Tannhäuser, Sb. Pr. Ak. Wiss., 1907, II, p. 843.	Gabbro.	
97	II.5.4.5.○	Q 3.72 di 9.34 or 1.12 hy 6.47 ab 23.06 mt 2.09 an 52.54 il 1.22	Schluckenau, Bohemia.	C. v. John.	C. v. John, Jb. G. R.-A., Wien., LII, p. 149, 1903.	Gabbro.	Inclusion in basalt.
98	II(III).5.4.(4)5.	or 2.22 di 2.48 ab 17.82 hy 20.47 an 45.04 ol 4.23 mt 4.87 il 2.13	Schluckenau, Bohemia.	C. v. John.	C. v. John, Jb. G. R.-A., Wien., LII, p. 150, 1903.	Gabbro.	Inclusion in basalt.

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
99	47.58	23.30	0.73	5.10	2.99	15.33	2.57	0.35	0.10	0.67	0.14		0.33		99.19	2.86
B3. IV	.793	.228	.005	.071	.075	.273	.042	.004			.002		.005			
100	54.39	17.96	2.91	6.29	4.43	7.96	2.40	1.80	1.14		trace	0.59	0.24	S 0.10	100.21	
A2. II	.907	.176	.018	.088	.111	.142	.039	.019			—	.004	.003			
101	47.41	20.20	4.51	9.85	2.83	10.99	2.29	0.43	0.21		0.63				99.35	
B3. IV	.790	.198	.028	.137	.071	.196	.037	.005			.008					
102	51.54	22.46	3.59	2.71	1.86	9.29	3.63	2.15	1.40		0.68	0.46	0.22	CO ₂ 0.12	100.11	
A2. II	.859	.221	.023	.038	.046	.166	.058	.023			.008	.003	.003			
103	47.60	17.23	4.31	7.20	6.07	9.70	2.62	1.74	1.36		1.50	0.41	0.23		99.97	
A2. II	.793	.169	.027	.100	.152	.173	.042	.018			.019	.003	.003			
104	50.80	17.73	1.39	3.42	10.19	7.62	2.03	1.34	4.33	0.15	0.61				99.61	2.89
A3. III	.847	.174	.009	.047	.255	.136	.032	.014			.008					
105	49.82	19.88	3.31	1.80	4.86	12.73	3.51	0.69	2.44		1.13				100.17	2.98
A3. III	.830	.195	.021	.025	.122	.227	.056	.007			.014					
106	50.81	18.02	1.96	6.39	8.29	10.10	2.30	0.27	0.94		0.64	trace	trace		99.72	
A3. III	.847	.176	.012	.089	.207	.180	.037	.003			.008	—	—			
107	49.18	17.94	4.30	9.04	6.68	9.50	2.84	0.45	n. d.		0.35		0.19		100.47	
A2. II	.820	.175	.027	.125	.167	.170	.045	.005			.004		.003			
108	47.71	17.98	4.70	7.38	4.30	9.91	3.02	0.97	0.62		1.67	0.77	0.58		99.61	
A2. II	.795	.176	.029	.103	.108	.177	.048	.010			.021	.005	.007			
109	49.95	19.17	4.72	6.71	5.03	9.61	3.13	0.74	0.09		0.69		trace		99.84	2.939
A3. III	.833	.188	.029	.093	.126	.171	.050	.008			.009		—			
110	53.35	18.94	3.71	5.35	4.15	8.50	2.56	1.19	1.13		0.93				99.81	
A3. III	.889	.186	.023	.075	.104	.152	.041	.013			.012					
111	53.33	21.21	1.67	3.25	2.60	10.04	3.22	2.25	0.90		0.47		1.29		100.23	
A?3. III	.889	.208	.010	.045	.065	.179	.052	.024			.006		.018			
112	53.68	18.73	3.33	5.96	3.64	7.43	3.41	0.51	1.54	0.08	0.82	none	0.30	CO ₂ 0.19 S 0.04 BaO 0.03	99.75	
A1. I	.895	.184	.021	.083	.091	.132	.055	.005			.010	—	.004			
113	47.23	18.49	6.14	8.70	3.92	7.89	2.84	0.51	1.26	0.04	2.04	0.14	0.63	CO ₂ 0.11 Cl trace S 0.17 Cr ₂ O ₃ trace BaO 0.01 SrO trace	100.21	
A1. I	.787	.181	.038	.122	.098	.141	.046	.005			.026	.001	.009			
114	50.56	17.67	1.04	8.79	4.77	8.25	3.23	0.93	0.19	0.20	2.43	0.34	0.25	Cl 0.11 S 0.20 X 0.25	99.21	
B2. III	.843	.173	.006	.122	.119	.147	.052	.010			.030	.002	.004			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
99	II.5.4.''5.	or 2.22 di 21.07 ab 14.67 ol 4.51 an 50.60 mt 1.16 ne 3.98 il 0.30	Richterhof, Bohemia.	A. Donatti.	W. Bergt, Z. D. G. G., LXI, p. 78, 1909.	Anorthosite.	
100	II.(4)5.''4.''4.	Q 7.68 di 2.51 or 10.56 hy 19.51 ab 20.44 mt 4.18 an 32.80 ap 1.84	Kanitz, Brünn, Moravia.	C. v. John.	C. v. John and Suess, Jb. G. R.-A., Wien., LVIII (1), p. 249, 1908.	Quartz diorite.	
101	II''.5.4.(4)5.	Q 0.84 di 9.38 or 2.73 hy 15.70 ab 19.39 mt 6.50 an 43.37 il 1.22	Oraviczabanya, Krasso-Szőreny, Hungary.	K. Emszt.	Rozlozonit and Emszt, Mt. Ung. G. A., XVI, p. 193, 1908.	Gabbro diorite.	
102	(I)II.5.(3)4.4.	Q 1.26 di 3.56 or 12.79 hy 4.22 ab 30.39 mt 5.34 an 38.92 il 1.22 ap 1.01	Avisio Bridge, n. Mezzavalle, Predazzo, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak. W., 1904, p. 41.	Monzonite.	
103	II(III).5.(3)4.4.	or 10.01 di 12.14 ab 22.01 hy 6.41 an 30.30 ol 7.55 mt 6.26 il 2.89 ap 1.01	Coronelle, Malgola, Predazzo, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak. W., 1904, p. 43.	Biotite gabbro.	
104	II(III).5.4.''4.	Q 1.32 di 1.76 or 7.78 hy 28.63 ab 16.77 mt 2.09 an 35.58 il 1.22	Piz GliEVERS Dado, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Augite porphyrite.	Fresh?
105	II.5.''4.(4)5.	or 3.89 di 20.52 ab 28.30 ol 1.39 an 36.70 mt 2.55 ne 0.57 il 2.13 hm 1.60	Piz Avat, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Augite kersantite.	
106	II(III).5.4.''5.	Q 0.90 di 9.85 or 1.67 hy 25.06 ab 19.39 mt 2.78 an 37.81 il 1.22	Val Donbastone, Valtellina, Lombardy.	Dittrich?	W. Rasch, N. J. B. B., XXXII, p. 222, 1911.	Norite.	
107	II(III).5.4.''4.(4)5.	or 2.78 di 10.26 ab 23.58 hy 15.76 an 34.75 ol 6.36 mt 6.26 il 0.61	Leprese, Valtellina, Lombardy.	O. Hecker.	O. Hecker, N. J. B. B., XVII, p. 332, 1903.	Hornblende gabbro.	
108	II(III).5.''4.4''.	Q 0.06 di 9.55 or 5.56 hy 14.04 ab 25.15 mt 6.73 an 32.80 il 3.19 ap 1.68	Between Ceppina and San Antonio, Valtellina, Lombardy.	A. Zapf.	A. Zapf, In. Diss., Jena, p. 46, 1910	Hornblende gabbro.	
109	II''.5.4.''5.	Q 0.42 di 9.02 or 4.45 hy 15.48 ab 26.20 mt 6.73 an 36.42 il 1.37	Ivrea, Piedmont.	M. Dittrich.	F. R. van Horn, T. M., P. M., XVII, p. 404, 1898.	Norite.	In W. T., p. 293.
110	II.(4)5.4.4.	Q 8.22 di 4.51 or 7.23 hy 13.49 ab 21.48 mt 5.34 an 36.70 il 1.82	Capo Sperone, San Antioco, Sardinia.	A. Johnsen.	A. Johnsen, Anh. Abh. Pr. Ak. W., No. 2, p. 59, 1912.	Hypersthene basalt.	Also in N. J. Cb., 1912, p. 738.
111	II.5.(3)4.''4.	Q 0.60 di 10.79 or 13.34 hy 7.36 ab 27.25 mt 2.32 an 36.70 il 0.91	Val Barca, Sassari, Sardinia.	F. Millosevich.	F. Millosevich, Mem. Ac. Linc. (5), VII (14), p. 426, 1908.	Hypersthene andesite.	MnO high?
112	II.(4)5.''4.''5.	Q 7.92 di 1.83 or 2.78 hy 15.60 ab 28.82 mt 4.87 an 34.47 il 1.52	Samoyed Urals, Russia.	H. Backlund.	H. Backlund, Mem. Imp. Ac. Sci. St. Pet., XXVIII, No. 3, p. 21, 1912.	Quartz gabbro.	
113	II''.5.4.(4)5.	Q 2.88 di 1.83 or 2.78 hy 17.75 ab 24.10 mt 8.32 an 36.14 il 3.95 ap 0.34	Samoyed Urals, Russia.	H. Backlund.	H. Backlund, Mem. Imp. Ac. Sci., St. Pet., XXVIII, No. 3, p. 30, 1912.	Beerbachite.	
114	II(III).5.(3)4.4''.	Q 0.66 di 6.64 or 5.56 hy 20.50 ab 27.25 mt 1.39 an 30.86 il 4.56 ap 0.67	Goroshki, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, Ref., N. J., 1899, I, p. 463.	Olivine norite.	In W. T., p. 293.

CLASS II. DOSALANE.—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
115	49.13	18.48	0.41	11.69	5.77	7.42	3.08	1.09	0.07	0.06	1.61	0.34	0.15	Cl 0.08 S 0.15	99.53	
A2. III	.819	.181	.003	.162	.144	.132	.050	.012			.020	.002	.002			
116	48.71	19.62	4.18	7.37	4.71	8.36	3.07	1.90	1.12		1.21	0.42			100.67	
A2. II	.812	.192	.026	.103	.118	.149	.050	.020			.015	.003				
117	51.80	16.01	5.80	8.70	5.00	8.25	2.40	1.50	n. d.		0.51				99.97	
A3. III	.863	.157	.036	.121	.125	.147	.039	.016			.006					
118	48.78	22.07	1.92	7.73	5.22	9.67	1.81	1.17	1.68		0.37	0.44	trace		100.86	
A2. II	.813	.218	.012	.107	.131	.173	.029	.012			.005	.003	—			
119	49.2	18.0	3.1	8.9	4.9	8.8	2.7	0.7	1.5		2.3				100.1	2.91
B3. IV	.820	.176	.019	.124	.123	.157	.044	.008			.029					
120	48.9	18.9	0.3	9.0	6.0	12.2	3.0	0.3	0.5		1.4				100.5	2.98
B3. IV	.815	.185	.002	.125	.150	.218	.048	.003			.013					
121	48.62	17.44	5.42	6.55	5.30	10.00	2.30	1.92	0.63		1.29	0.11	0.21		99.79	
A?2. II	.810	.171	.034	.091	.133	.179	.037	.020			.016	.001	.003			
122	48.29	19.38	3.49	5.22	4.19	10.13	3.08	1.08	1.48	0.48	2.00	0.80			99.62	
A2. II	.805	.190	.022	.072	.105	.180	.050	.012			.025	.006				
123	44.44	19.46	5.76	5.02	4.92	14.03	2.12	0.74	0.70	0.07	2.71	0.22			100.19	
A2. II	.741	.191	.036	.069	.123	.250	.034	.008			.034	.002				
124	46.27	18.43	3.98	8.22	3.75	12.33	2.58	0.96	n. d.		2.98	0.33			99.83	
A2. II	.771	.181	.025	.114	.094	.220	.042	.010			.037	.002				
125	52.86	18.25	6.61	3.39	4.72	9.58	3.24	0.69	0.24				0.16		99.74	
A3. III	.881	.179	.041	.047	.118	.171	.052	.007					.002			
126	52.13	16.73	3.16	5.43	5.05	9.10	2.81	1.40	2.47		1.60	0.51	trace		100.39	
A2. II	.869	.164	.020	.075	.126	.163	.045	.015			.020	.004	—			
127	48.75	17.41	1.40	7.83	5.18	9.68	3.07	1.27	2.70		2.32	0.19			99.80	
A2. II	.813	.171	.009	.108	.130	.173	.050	.014			.029	.001				
128	53.06	19.95	3.24	4.94	3.64	9.41	3.24	0.94	0.06	0.01	0.77	0.06	0.59	ZrO ₂ none Cl 0.08 F 0.07 S 0.03 Cr ₂ O ₃ none BaO 0.06 SrO 0.02	100.17	
A1. I	.884	.196	.020	.068	.091	.168	.052	.010			.010	—	.008			
129	52.33	17.33	3.51	5.73	5.30	10.71	3.17	0.94	0.38	none	0.31	0.07	0.24	ZrO ₂ none Cl 0.08 F 0.05 S 0.03 Cr ₂ O ₃ 0.01 BaO 0.07 SrO 0.03	100.29	
A1. I	.872	.170	.022	.079	.133	.191	.051	.010			.004	—	.003			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
115	II''5.''4.4.	or 6.67 di 1.40 ab 26.20 hy 13.42 an 33.08 ol 14.00 mt 0.70 il 3.04 ap 0.67	Gazkowskaia Rudnaia, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, Ref. N. J., 1899, I, p. 463.	Olivine norite.	In W. T., p. 293.
116	II.5.(3)4.4.	or 11.12 di 3.87 ab 26.20 hy 7.20 an 33.92 ol 7.95 mt 6.03 il 2.28 ap 1.01	Sao Vicente, Cape Verde Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 656, 1912.	Trachy- dolerite.	
117	II(III)''5.(3)4.4.	Q 4.80 di 10.30 or 8.90 hy 17.85 ab 20.48 mt 8.35 an 28.36 il 0.91	Near Kadero, Kordofan.	G. Linck.	G. Linck, N. J. B. B., XVII, p. 432, 1903.	Gabbro porphyrite.	
118	II.5.4.4.⊙	Q 1.20 hy 24.98 or 6.67 mt 2.78 ab 15.20 il 0.76 an 45.31 ap 1.01 C 1.43	Near Abu Uruf, Kordofan.	Sprockhoff.	G. Linck, N. J. B. B., XVII, p. 412, 1903.	Gabbro.	
119	II(III).5.4.4''.	Q 1.68 di 7.55 or 4.45 hy 18.62 ab 23.06 mt 4.41 an 34.47 il 4.41	Karakourkoura, French Somali.	H. Arsandaux.	H. Arsandaux, C. R., CXXXVII, p. 1310, 1903.	Labradorit (basalt).	Also in Roches Est Afr., p. 95, 1906.
120	II(III).5.4.5.	or 1.67 di 16.97 ab 25.15 hy 0.56 an 37.25 mt 14.62 il 2.74	Gubbet Karab, French Somali.	H. Arsandaux.	H. Arsandaux, C. R., CXXXVII, p. 1310, 1903.	Basalt.	Also in Roches Est. Afr., p. 95, 1906.
121	II(III).5.''4.(3)4.	Q 0.06 di 13.87 or 11.12 hy 12.43 ab 19.39 mt 7.89 an 31.69 il 2.43 ap 0.34	Mount Nawigawo, Lake Kivu Dis- trict, German East Africa.	O. Hauser.	L. Finckh, D. Zentr. Afr. Exp., I (1), p. 18, 1912.	Leucite basanite.	Norm and mode? Alkalies?
122	II.5.''4.4.	Q 0.90 di 7.10 or 6.67 hy 10.41 ab 26.20 mt 5.10 an 35.58 il 3.80 ap 2.02	Raimany River, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 20, 1913.	Labradorite (basalt).	
123	II(III).5.4.4.	or 4.45 di 20.30 ab 16.24 ol 2.03 an 41.42 mt 8.12 ne 0.85 il 5.17 hm 0.16 ap 0.67	Nosy Komba, Madagascar.	Not stated.	A. Lacroix, pers. com.	Essexitic gabbro.	Cf. No. 60, II.5.3.3 and No. 44, II.6.3.4.
124	II(III).5.4.4.	or 5.56 di 19.10 ab 22.01 hy 0.43 an 35.86 ol 4.73 mt 5.80 il 5.62 ap 0.67	Avirons, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 543, 1912.	Labradorite (basalt).	
125	II.(4)5.''4.(4)5.	Q 7.20 di 11.12 or 3.39 hy 7.66 ab 27.25 mt 9.51 an 33.36	Anaun Volcano, Kamchatka.	Not stated.	K. Bogdanowitsch, Pet. Mt., I, p. 122, 1904.	Andesite.	Ignition given as 52.86.
126	II''.''5.(3)4.4.	Q 5.64 di 10.26 or 8.34 hy 12.30 ab 23.58 mt 4.64 an 28.91 il 3.04 ap 1.34	Yui, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Koza, Sc. Rep. Toh. Un. (2), I, p. 49, 1913.	Andesite.	
127	II(III).5.(3)4.4.	or 7.78 di 14.31 ab 26.20 hy 4.55 an 29.75 ol 7.81 mt 2.09 il 4.41 ap 0.34	Tien-chann, East Yunnan, China.	Pisani.	J. Deprat, Mem. Sv. G. Indoch., I (1), 1, p. 232, 1912.	Labradorite (basalt).	
128	II.5.''4.4''.	Q 4.38 di 7.69 or 5.56 hy 11.42 ab 27.25 mt 4.64 an 37.25 il 1.52	Mayon Volcano, Luzon, Philip- pine Islands.	E. W. Morley.	J. P. Iddings, pers. com.	Basalt.	Iddings and Morley, Pr. Nat. Ac. Sc., II, p. 533, 1916.
129	II(III).5.(3)4.4''.	Q 1.02 di 18.48 or 5.56 hy 11.72 ab 26.72 mt 5.10 an 30.30 il 0.61	Taal Volcano, Luzon, Philip- pine Islands.	E. W. Morley.	J. P. Iddings, pers. com.	Basalt.	Iddings and Morley, Pr. Nat. Ac. Sc., II, p. 533, 1916.

CLASS II. DOSALANE—Continued.

RANG 4. DOALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
130	50.54	21.63	3.64	4.22	3.06	10.47	2.88	1.57	0.72	0.19	0.34	0.24	0.17	ZrO ₃ none Cl 0.08 F 0.02 S 0.01 Cr ₂ O ₃ 0.01 BaO 0.05 SrO 0.04	99.88	
A1. I	.842	.212	.023	.058	.077	.188	.047	.017			.004	.002	.002			
131	47.98	18.94	7.08	3.98	7.06	11.01	2.56	0.44	0.70	0.38					100.13	
A3. III	.800	.185	.044	.056	.176	.196	.041	.005								
132	53.18	21.14	1.22	6.22	3.66	7.36	4.06	0.74	0.62		0.83		0.57		99.60	
A2. II	.886	.207	.008	.086	.092	.131	.066	.008			.010		.008			
133	50.84	19.81	6.68	3.21	4.01	8.90	3.53	1.01	1.02	0.12	0.81	0.31			100.25	
A2. II	.847	.194	.042	.044	.100	.159	.056	.011			.010	.002				
134	51.12	19.59	2.86	6.53	4.47	9.54	3.11	0.57	0.11	none	0.86	0.14	0.65	ZrO ₃ none Cl 0.10 F 0.04 S 0.06 Cr ₂ O ₃ none BaO 0.03 SrO 0.03	99.81	
A1. I	.852	.192	.018	.090	.112	.170	.050	.006			.011	.001	.009			
135	51.68	19.77	6.19	3.33	3.52	8.60	3.13	1.24	0.82		1.35	0.25	0.08	SO ₃ 0.04	100.00	2.76
A2. II	.861	.194	.039	.046	.088	.154	.050	.013			.016	.002	.001			
136	50.39	21.77	3.51	5.23	3.55	10.61	1.63	1.34	0.06	0.41	0.75	0.60	0.10		99.96	2.88
A2. II	.840	.214	.022	.073	.089	.189	.026	.014			.009	.004	.001			
137	50.04	18.68	0.80	6.91	7.79	9.88	2.35	0.12	1.74	0.28	0.80	0.16	0.14	CO ₂ 0.27 ZrO ₃ none SO ₃ 0.49 Cl none F none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.03 NiO none BaO trace SrO trace Li ₂ O none CuO 0.08	100.58	2.977
A1. I	.834	.183	.005	.096	.195	.177	.038	.001			.010	.001	.002			
138	48.86	21.88	1.83	4.87	3.79	11.69	3.30	0.20	1.22	1.04	1.26	0.28	0.34	NiO 0.10	100.66	
A2. II	.914	.215	.011	.068	.095	.209	.053	.002			.017	.002	.005			
139	45.28	21.04	5.22	5.14	5.53	11.66	2.57	1.98	0.43	0.13	0.46	0.22	0.31	CO ₂ 0.02 ZrO ₃ none SO ₃ 0.04 Cl 0.06 F none Cr ₂ O ₃ none V ₂ O ₅ trace NiO none BaO 0.11 SrO trace Li ₂ O trace	100.20	2.955
A1. I	.755	.206	.033	.071	.138	.208	.042	.021			.006	.002	.004			
140	53.18	17.61	1.59	6.47	6.59	10.42	2.03	0.70	0.40		0.78	trace	0.10	CO ₂ trace SO ₃ none S trace Cr ₂ O ₃ trace NiO trace BaO 0.13 SrO 0.02	100.35	2.88
A1. I	.886	.173	.010	.090	.165	1.86	.032	.008			.010	—	.001			
141	53.11	15.55	1.26	7.17	6.50	8.93	3.03	0.28	3.12	0.04	0.40		0.59	CO ₂ 0.32 FeS ₂ 0.07	100.37	2.91
A2. II	.885	.152	.008	.100	.163	.159	.048	.003			.005		.008			
142	54.95	19.56	3.15	3.78	3.01	8.70	2.97	1.59	1.05		0.95		0.08		99.64	
A2. II	.916	.192	.020	.053	.075	.155	.048	.017			.012		.001			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSESE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
130	II.5.4.4.⊙	Q 1.14 di 7.45 or 9.45 hy 8.44 ab 24.63 mt 5.34 an 41.14 il 0.61 ap 0.67	Antipolo, Luzon, Philip- pine Islands.	E. W. Morley.	J. P. Iddings, pers. com.	Basalt.	Iddings and Morley, Pr. Nat. Ac. Sc., II, p. 533, 1916.
131	II(III).5.4.(4)5.	Q 0.30 di 12.23 or 2.78 hy 13.46 ab 21.48 mt 10.41 an 38.92	Mancayan, Lepanto Prov- ince, Luzon, Philippine Islands.	L. S. Salinger.	A. J. Eveland, B. Min. Bur. Man., 4, p. 39, 1905.	Diorite.	
132	II.5.(3)4.(4)5.	Q 0.72 hy 19.23 or 4.45 mt 1.88 ab 34.58 il 1.52 an 38.42 C 0.20	Salé Itji, Ternate, Celebes.	Ledeboer.	R. D. M. Verbeek, Jb. Mijnw., XXXVII, p. 233, 1908.	Hornblende gabbro.	
133	II.5.(3)4.4''.	Q 3.54 di 6.91 or 6.12 hy 6.80 ab 29.34 mt 7.89 an 35.31 il 1.52 hm 1.28 ap 0.67	Sibajak, Karoland, Sumatra.	M. Dittrich.	H. Stegmann, N. J. B. B., XXVII, p. 442, 1909.	Inclusion in andesite.	Cf. No. 219, II.4.3.4.
134	II.5.4.(4)5.	Q 1.86 di 7.08 or 3.34 hy 16.96 ab 26.20 mt 4.18 an 37.81 il 1.67 ap 0.34	Goentoer Volcano, Java.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Basalt.	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.
135	II.'5.''4.4.	Q 6.60 di 4.97 or 7.23 hy 6.50 ab 26.20 mt 7.19 an 36.42 il 2.43 hm 1.28 ap 0.67	Koka Triboelan, Sumbawa Island.	A. Lindner.	G. Rack, N. J. B. B., XXXIV, p. 61, 1912.	Labrador- andesite.	
136	II.(4)5.4''.(3)4.	Q 7.14 di 0.43 or 7.78 hy 14.28 ab 13.62 mt 5.10 an 48.37 il 1.37 ap 1.34	Gapit River, Sumbawa Island.	A. Lindner.	G. Rack, N. J. B. B., XXXIV, p. 63, 1912.	Labrador- andesite.	
137	II(III).5.4.5.	Q 0.24 di 6.77 or 0.56 hy 27.17 ab 19.91 mt 1.16 an 40.03 il 1.52 0.34	Murgatroyd's tunnel, New England, New South Wales.	J. C. H. Min- gay.	E. Andrews, Rec. G. S. N. S. W., VIII (3), p. 216, 1907.	Diorite.	
138	II.5.4.5.⊙	or 1.11 d 9.49 ab 27.77 hy 6.84 an 44.48 ol 2.90 mt 2.55 il 2.68 ap 0.67	Dundas, n. Sydney, New South Wales.	W. N. Benson.	W. N. Benson, Pr. R. Soc. N. S. W., XLIV, p. 517, 1910.	Anorthosite.	
139	II.5''4.''4.	or 11.68 di 12.88 ab 12.58 ol 8.51 an 39.75 mt 7.66 ne 5.11 il 0.91 ap 0.67	Good Dog Mountain, Cambewarra Range, New South Wales.	H. P. White.	Card and Jaquet, Rec. G. S. N. S. W., VII, p. 121, 1902.	Lampro- phyre.	
140	II(III).''5.4.4.	Q 5.46 di 11.99 or 4.45 hy 20.03 ab 16.77 mt 2.32 an 36.97 il 1.54	Kangaroo Island, South Australia.	E. R. Stanley.	E. R. Stanley, Tr. R. Soc. S. Aust., XXXIV, p. 72, 1910.	Enstatite basalt.	
141	II(III).''5.''4.5.	Q 3.66 di 13.20 or 1.67 hy 22.37 ab 25.15 mt 1.88 an 28.08 il 0.76	Mount Anketel, West Pilbara, Western Australia.	Not stated.	J. A. Thompson in A. G. Maitland, W. Aust. G. S. B. 33, p. 148, 1909.	Augite andesite.	
142	II.(4)5.''4.4.	Q 8.82 di 6.24 or 9.45 hy 7.41 ab 25.15 mt 4.64 an 35.31 il 1.82	New Plymouth, Taranaki, New Zealand.	J. S. MacLaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Andesite.	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
143	52.00	18.69	6.71	2.67	3.65	8.72	2.84	1.26	2.82		0.89		0.09		100.34	
A2. II	.867	.183	.042	.038	.091	.155	.046	.014			.011		.001			
144	52.65	18.87	3.28	4.75	4.81	8.80	2.74	0.68	2.19		1.08		0.15	BaO 0.09	100.09	
A2. II	.878	.185	.021	.066	.120	.157	.044	.007			.014		.002			
145	50.05	17.53	4.40	4.82	6.46	8.05	2.47	1.67	2.83		1.42		0.30	CO ₂ none	100.00	
A2. II	.834	.172	.028	.067	.162	.144	.040	.018			.018		.004			
146	47.70	18.41	5.40	6.84	5.21	9.60	2.58	0.78	0.82	0.20	0.90	1.05	0.15		99.72	
A2. II	.795	.180	.034	.095	.130	.171	.042	.008			.011	.007	.002			
147	45.78	19.18	3.28	9.14	6.03	8.20	2.27	1.32	2.64	0.38	1.26	0.73	0.17	SO ₂ 0.17	100.55	
A2. II	.763	.188	.021	.127	.151	.146	.037	.014			.018	.005	.002			
148	45.29	22.69	2.76	5.56	5.75	11.95	2.84	0.52	1.47		0.75	0.03	0.08		99.69	
A2. II	.755	.222	.017	.077	.144	.214	.046	.006			.009	—	.001			
149	49.72	20.95	5.45	3.50	3.41	12.54	2.23	1.13	1.32						100.25	
A3. III	.829	.205	.034	.049	.085	.224	.035	.012								
150	49.63	18.60	8.24	5.33	4.67	9.31	2.36	1.40	1.00						100.54	
A3. III	.827	.182	.052	.074	.117	.166	.038	.015								
151	48.24	17.41	5.62	5.79	7.08	12.27	2.44	1.01	0.60						100.46	
A3. III	.804	.171	.035	.081	.177	.220	.039	.011								
152	47.66	18.66	10.56	2.19	5.07	11.03	2.82	1.00	1.16						100.15	
A3. III	.794	.183	.066	.031	.127	.196	.045	.011								
153	47.44	18.36	12.03	2.16	5.77	10.20	2.22	1.15	1.03						100.36	
A3. III	.791	.180	.075	.030	.144	.182	.035	.013								
154	45.25	18.89	5.52	6.36	6.08	11.00	3.42	1.15	1.23		1.04	0.34			100.28	
A2. II	.754	.185	.034	.089	.152	.196	.055	.012			.013	.002			(100.03)	
155	45.21	19.16	4.86	7.11	5.73	10.82	3.18	1.24	0.94		1.20	0.28			99.73	
A2. II	.754	.188	.031	.099	.143	.193	.052	.013			.015	.002				
156	56.10	19.81	2.07	5.15	3.44	7.20	3.55	1.08	0.75		0.76	trace			99.91	
A3. III	.935	.195	.013	.072	.086	.129	.057	.012			.010	—				
157	51.16	16.12	7.09	7.24	3.68	8.55	3.33	0.57	1.52		0.07	0.96	0.15		100.44	
A2. II	.853	.158	.044	.101	.092	.153	.053	.006			.001	.007	.002			
158	54.24	17.20	2.81	4.98	5.84	10.19	2.91	0.92	0.09		0.91	0.09			100.18	
A2. II	.904	.167	.018	.069	.146	.182	.047	.010			.011	—				
159	49.84	19.37	3.42	3.69	4.71	12.35	2.50	0.87	1.79		1.32	0.11			99.97	
A2. II	.831	.190	.021	.051	.118	.221	.040	.009			.017	.001				

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSESE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
143	II.(4)5.''4.4.	Q 8.28 di 6.91 or 7.78 hy 5.90 ab 24.10 mt 6.50 an 34.19 il 1.67 hm 2.24	New Plymouth, Taranaki, New Zealand.	J. S. MacLaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Andesite.	
144	II.(4)5.4.4(5).	Q 7.74 di 4.88 or 3.89 hy 14.03 ab 23.06 mt 4.87 an 37.25 il 2.13	Thames, Hauraki, Auckland, New Zealand.	J. S. MacLaurin.	C. Fraser, N. Z. G. S. B. 10, p. 24, 1910.	Pyroxene andesite.	
145	II.''5.''4.4.	Q 2.46 di 6.61 or 10.01 hy 16.37 ab 20.96 mt 6.50 an 31.69 il 2.74	Flat Island, Whangaroa, New Zealand.	J. S. MacLaurin.	Bell and Clarke, N. Z. G. S. B. 8, p. 71, 1909.	Dolerite.	
146	II.5.4.4''.	Q 2.10 di 4.05 or 4.45 hy 17.90 ab 22.01 mt 7.89 an 36.14 il 1.67 ap 2.35	Mackley River, Orikaka District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Diorite.	To be pub. in N. Z. G. S. B. 17.
147	II(III).5.4.4.	or 7.78 hy 17.59 ab 19.39 ol 6.37 an 35.86 mt 4.87 C 0.82 il 2.74 ap 1.68	Inangahua Road, Waitahu, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Diorite.	
148	II.5.4.(4)5.	or 3.34 di 10.05 ab 16.24 ol 11.95 an 47.26 mt 3.94 ne 4.26 il 1.37	New Caledonia.	Boiteau.	A. Lacroix, C. R., CLII, p. 820, 1911.	Diorite.	
149	II.5.4.4.⊙	Q 3.90 di 14.58 or 6.67 hy 3.56 ab 18.34 mt 7.89 an 43.92	St. Paul Island, Indian Ocean.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 69, 1908.	Basalt.	
150	II.''5.4.4.	Q 4.56 di 8.19 or 8.34 hy 10.61 ab 19.91 mt 12.06 an 35.86*	St. Paul Island, Indian Ocean.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (5), p. 389, 1909.	Basalt.	
151	II(III).5.4.4.	or 6.12 di 22.02 ab 20.44 hy 0.43 an 33.64 ol 9.20 mt 8.12	Station 168, 2,414 meters deep, 114 miles northeast of New Amsterdam.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 73, 1908.	Basalt.	Interior of dredged block. Cf. No. 20, p. 773.
152	II.''5.4.4.	Q 0.48 di 14.90 or 5.12 hy 5.80 ab 23.58 mt 7.19 an 35.31 hm 5.60	Gazelle Harbor, Kerguelen Island.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 64, 1908.	Basalt.	
153	II.''5.4.4.	Q 2.70 di 10.80 or 7.23 hy 9.40 ab 18.34 mt 6.96 an 36.70 hm 6.84	Gazelle Harbor, Kerguelen Island.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 64, 1908.	Basalt.	
154	II(III).5(6).(3) 4.4''.	or 6.67 di 15.14 ab 17.82 ol 9.72 an 32.80 mt 7.89 ne 5.96 il 1.98 ap 0.67	Possession Island, Crozet Islands.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (4), p. 332, 1908.	Basalt.	
155	II(III).5''.(3)4.4.	or 7.23 di 14.19 ab 17.29 ol 14.43 an 34.19 mt 7.19 ne 5.40 il 2.28 ap 0.67	Possession Island, Crozet Islands.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (4), p. 332, 1908.	Basalt.	
156	II.(4)5.(3)4.4''.	Q 7.86 di 0.68 or 6.12 hy 14.74 ab 29.87 mt 3.02 an 35.03 il 1.52	Port Locroy, Graham Land, Antarctica.	Pisani.	E. Gourdon, Exp. Ant. Fr., Petr. vol., p. 183, 1908.	Labradorite (andesite).	
157	II''.(4)5.(3)4.(4) 5.	Q 7.32 di 7.08 or 3.34 hy 13.11 ab 27.77 mt 10.21 an 27.52 il 0.15 ap 2.35	Moreno Island, 64° 4' S, 61° 20' W., Antarctica.	E. Zdarek.	A. Pelikan, Voy. Belgica, V, Petr. Unter., I, p. 8, 1909.	Augite diorite.	TiO ₂ and P ₂ O ₅ interchanged?
158	II''.''5.''4.4''.	Q 5.04 di 16.03 or 5.56 hy 12.20 ab 24.63 mt 4.18 an 30.58 il 1.67	Bridgman Island, South Shetland Islands, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Basalt.	
159	II.5.4.4.⊙	Q 2.82 di 16.89 or 5.00 hy 5.56 ab 20.96 mt 4.87 an 39.20 il 2.58 ap 0.34	Deception Island, South Shetland Islands, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Labradorite (basalt).	

CLASS II. DOSALANE—Continued.

RANG 4. DOCALCIC. HESSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
160	49.69	20.07	2.47	5.22	5.75	12.20	2.39	0.45	0.54		0.99	0.09			99.76	
A2. II	.828	.197	.015	.072	.144	.218	.039	.005			.012	—				
161	52.02	18.26	3.55	6.92	4.08	7.93	3.84	0.31	1.44		1.40	0.51			100.26	
A2. II	.867	.179	.022	.096	.102	.141	.062	.003			.018	.004				
162	50.55	18.44	5.29	5.87	4.45	8.39	3.54	0.43	1.23		1.32	0.35			99.96	
A2. II	.843	.181	.033	.082	.111	.150	.057	.005			.017	.002				
163	49.29	16.65	5.39	5.68	5.49	9.64	2.79	0.79	1.62		1.99	0.46			99.79	
A2. II	.822	.163	.034	.079	.137	.172	.045	.008			.025	.003				
164	48.50	19.26	4.24	5.26	4.63	12.86	2.02	1.06	0.50		1.32	0.19			99.84	
A2. II	.808	.189	.026	.073	.116	.230	.032	.012			.017	.001				
165	48.11	23.08	2.29	3.28	5.55	14.53	1.81	0.23	0.88		0.33	0.06			100.15	
A2. II	.802	.226	.014	.046	.139	.259	.029	.002			.004	—				

RANG 5. PERCALCIC. CORSASE. (C. I. P. W., 1902.)

1	44.04	20.01	4.22	8.61	5.01	11.68	1.24	0.15	1.90	0.11	2.24	0.52	0.28	CO ₂ none ZrO ₂ 0.10 FeS ₂ 0.25 Cr ₂ O ₃ none V ₂ O ₅ 0.05 NiO 0.01 BaO none SrO none Li ₂ O trace	100.42	3.037
A1. I	.734	.196	.026	.120	.125	.209	.020	.002			.028	.004	.004			
2	43.41	23.15	3.72	4.39	7.65	14.27	0.82	0.22	1.53	0.18	0.39	0.02	0.08	CO ₂ 0.10 Cl trace FeS ₂ 0.14 Cr ₂ O ₃ none NiO none BaO none SrO none Li ₂ O trace	100.09	
A1. I	.724	.226	.023	.061	.191	.255	.013	.002			.005	—	.001			
3	46.39	26.28	2.02	3.15	4.82	15.29	1.63	0.20	0.48	0.10	0.26	trace	0.14	Cr ₂ O ₃ 0.03 V ₂ O ₅ 0.03	100.82	2.85
A2. II	.773	.258	.013	.044	.121	.273	.026	.002			.003	—	.002			
4	46.55	24.87	3.56	0.40	6.38	14.17	0.84	0.26	3.00		0.33		0.06		100.42	2.88
A2. II	.776	.244	.023	.006	.160	.254	.014	.003			.004		.001			
5	45.20	29.72	2.18	n. d.	3.49	15.40	0.82	0.07	2.80		0.31		0.09		100.08	2.92
A3. III	.753	.291	.014	(.028)	.087	.275	.013	.001			.004		.001			
6	42.16	28.20	1.22	2.14	6.05	15.40	0.81	0.17	3.10			0.20		S 0.07	99.52	
A3. III	.703	.276	.008	.029	.151	.275	.013	.002				.001				
7	48.59	27.54	0.20	1.37	6.91	11.87	1.26	0.15	1.86	0.15	0.06	trace	0.20	CO ₂ 0.23 Cr ₂ O ₃ 0.08 BaO 0.02	100.49	
A2. II	.805	.270	.001	.019	.173	.213	.020	.002			—	—	.003			
8	42.92	26.42	3.97	2.81	7.26	15.40	0.63	trace	0.80						100.21	
A3. III	.715	.259	.025	.039	.182	.272	.009	—								

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG 4-5. PRESODIC. HESSOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
160	II''5.4.(4)5.	Q 0.24 di 14.52 or 2.78 hy 13.36 ab 20.44 mt 3.48 an 42.53 il 1.82	Sounding, 70° S., 81° W. Paris, Weddell quad- rant, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Gabbro.	Dredged block.
161	II.''5.(3)4.5.	Q 4.62 di 3.19 or 1.67 hy 16.03 ab 32.49 mt 5.10 an 31.69 il 2.74 ap 1.34	Jenny Island, Weddell quad- rant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Augite andesite.	
162	II.5.''4.''5.	Q 3.96 di 5.34 or 2.78 hy 12.76 ab 29.87 mt 7.66 an 33.08 il 2.58 ap 0.67	Jenny Island, Weddell quad- rant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Augite andesite.	
163	II(III)''5.''4.(5).	Q 4.50 di 11.45 or 4.45 hy 10.92 ab 23.58 mt 7.89 an 30.58 il 3.80 ap 1.01	Jenny Island, Weddell quad- rant, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Basalt.	
164	II''5.4.4.	Q 1.56 di 18.25 or 6.67 hy 6.82 ab 16.77 mt 6.03 an 40.31 il 2.58 ap 0.34	Jenny Island, Weddell quad- rant, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Gabbro.	
165	II.5.4(5).5.	or 1.11 di 14.17 ab 15.20 hy 9.78 an 54.21 ol 0.76 mt 3.25 il 0.61	Webb Island, Laubeuf Fiord, Weddell quad- rant, Antarctica.	Boiteau.	E. Gourdon, pers. com.	Gabbro.	

SUBRANG. NOT NEEDED.

1	II(III).5.(4)5.0.	Q 2.04 di 5.69 or 1.11 hy 18.95 ab 10.48 mt 6.03 an 48.37 il 4.26 ap 1.01	Stone Run, Cecil County, Maryland.	W. F. Hille- brand.	A. G. Leonard, A. G., XXVIII, p. 146, 1901.	Diorite.	In W. T., p. 293.
2	II.5.''5.0.	or 1.11 di 9.76 ab 6.81 hy 7.02 an 58.66 ol 8.48 mt 5.34 il 0.76	Phoenix Reservoir, Tuolumne County, Cali- fornia.	H. N. Stokes.	H. W. Turner, J. G., VII, p. 150, 1899.	Olivine gabbro.	In W. T., p. 293.
3	II.5.(4)5.5.''0.	or 1.11 di 9.58 ab 13.62 hy 1.06 an 63.94 ol 7.47 mt 3.02 il 0.46	Cuillin Laccolite, Sligachan, Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, p. 103, 1904.	Olivine gabbro.	
4	II.5.''5.0.	Q 1.98 di 5.83 or 1.67 hy 13.30 ab 7.34 mt 0.70 an 63.11 il 0.61 hm 3.20	Schlumpskoppe, Neurode, Silesia.	O. Hauser.	F. Tannhäuser, Sb. Pr. Ak. Wiss., 1908, II, p. 1072.	Forellen- stein (troctolite).	
5	(I)II.5.5.0.	Q 0.42 hy 12.00 or 0.56 il 0.61 ab 6.81 an 76.45 C 0.20	Schlumpskoppe, Neurode, Silesia.	O. Hauser.	F. Tannhäuser, Sb. Pr. Ak. Wiss., 1908, II, p. 1070.	Anorthosite.	
6	''II.5.5.0.	or 1.11 di 2.41 ab 5.24 ol 11.91 an 72.56 mt 1.86 ne 0.85 ap 0.34	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R. A. Wien, LIX, p. 197, 1909.	Olivine gabbro.	
7	II.5.''5.0.	Q 3.18 hy 20.77 or 1.11 mt 0.23 ab 10.48 an 59.21 C 3.57	Mount Neravet- keu, Samoyed Urals, Russia.	H. Backlund.	H. Backlund, Mem. Imp. Ac. Sci. St. Pet., XXVIII, No. 3, p. 46, 1912.	Anorthosite.	
8	II.5.5.0.⊙	ab 4.72 di 4.81 an 69.50 hy 6.16 ol 8.20 mt 5.80	Talaya, Ural Mountains, Russia.	L.-Lessing and Kultacheff.	Loewinson-Lessing, Jashno-Saorsk., p. 166, 1900.	Pyroxene granulite (gabbro).	In W. T., p. 293.

CLASS II. DOSALANE—Continued.

RANG 5. PERCALCIC. CORSASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9	44.12	25.13	0.87	3.85	9.51	14.19	1.16	0.17	0.25	0.11	0.20	0.10			99.86	
A2. II	.735	.246	.005	.054	.238	.254	.019	.002			.003	.001				
10	44.40	20.55	6.57	9.26	5.21	11.50	1.14	0.19	1.00						99.82	3.035
A3. III	.740	.201	.041	.129	.130	.205	.018	.002								
11	45.84	20.42	6.51	6.64	4.85	13.27	1.13	0.23	1.27		0.18	0.04	trace		100.38	
A2. II	.764	.200	.041	.092	.121	.238	.018	.002			.002	—	—			
12	47.51	23.03	1.08	4.00	6.69	15.08	1.41	0.22	0.98		0.38				100.38	
A3. III	.902	.225	.007	.056	.167	.270	.023	.002			.005					
13	43.29	21.11	4.98	7.50	6.48	13.25	1.34	0.26	0.17		1.14	trace			100.52	
A3. III	.722	.207	.031	.104	.162	.237	.022	.003			.014	—			(99.48)	

CLASS II. DOSALANE.

RANG 1. PERALKALIC. LARDALASE. (C. I. P. W., 1902.)

1	57.46	15.40	4.87	0.87	1.37	2.59	5.48	9.44	0.82	0.09	0.60	0.21	trace	CO ₂ 0.13 SO ₃ 0.13 Cl 0.20 F trace BaO 0.60 SrO 0.16	100.42	
A1. I	.958	.151	.031	.012	.034	.046	.089	.100			.008	.001	—			
2	51.75	14.52	5.08	3.58	4.55	7.04	2.93	7.61	2.25		0.23	0.18	trace	SO ₃ trace Cl 0.05 BaO 0.30 SrO 0.07	100.14	
A1. I	.863	.142	.035	.050	.114	.126	.047	.081			.003	.001	—			
3	51.20	14.47	6.76	2.94	6.19	4.81	2.01	9.50	0.86		1.23	0.70			99.72	
A2. II	.840	.142	.043	.041	.155	.086	.039	.101			.015	.005				
4	49.60	14.30	6.91	3.05	6.54	5.45	1.97	8.78	0.93		1.01	0.59			99.63	
A2. II	.827	.140	.043	.043	.164	.097	.032	.094			.013	.004				

RANG 1. PERALKALIC. LARDALASE.

1	52.53	18.31	0.34	6.43	1.82	3.15	7.26	6.47	1.16			1.59	0.15	Cl 0.40 F 0.32	99.93	
A2. II	.876	.180	.002	.089	.046	.056	.117	.069				.011	.002			
2	52.91	19.49	4.78	2.05	0.29	2.47	7.13	7.88	1.19		none	trace	0.44	Cl 0.53 S 0.52 X 0.48 SrO 0.09 Li ₂ O trace	100.25	
A1. I	.882	.191	.030	.029	.007	.045	.114	.084			—	—	.006			
3	57.63	17.53	3.46	1.18	0.22	1.35	5.80	9.16	3.22		0.23	trace	trace	Cl 0.08 Li ₂ O trace	99.86	
A2. II	.961	.172	.022	.017	.006	.024	.094	.098			.003	—	—			
4	53.42	21.04	1.74	2.83	0.61	2.88	7.80	7.48	0.76	0.04	0.60	0.10	0.07	CO ₂ 0.43 SO ₃ 0.07 Cl 0.10	99.96	2.609
A2. II	.890	.206	.011	.039	.015	.051	.126	.080			.008	.001	.001			

ORDER 5. PERFELIC. GERMANARE—Continued.

SUBRANG. NOT NEEDED—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	II.5."5.0.	or 1.11 di 5.75 ab 7.07 ol 19.40 an 62.55 mt 1.16 ne 1.56 il 0.46 ap 0.94	Mount Fonjay, Sakalave region, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 14, 1913.	Allivalite.	
10	II(III).5."5.0.	Q 0.96 di 5.50 or 1.11 hy 21.90 ab 9.43 mt 9.51 an 50.32	Bluff, Otago, New Zealand.	L. J. Wild.	L. J. Wild, Tr. N. Z. Inst., XLIV (1911), p. 325, 1912.	Segregation in norite.	
11	II(III).5.(4)5.0.	Q 3.84 di 11.25 or 1.11 hy 13.12 ab 9.43 mt 9.51 an 50.04 il 0.30	Bob Island, 64° 51' S., 63° 21' W., Wieneke Island, Antarctica.	E. Zdarek.	A. Pelikan, Voy. Belgica, V, Pet. Unt., I, p. 41, 1909.	Gabbro.	
12	II".5.(4)5.0.	or 1.11 di 15.60 ab 12.05 hy 6.72 an 55.60 ol 5.97 mt 1.62 il 0.76	Leonie Island, Weddell quad- rant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Gabbro.	
13	II(III).5.(4)5.0.	or 1.67 di 12.36 ab 11.53 hy 3.26 an 50.60 ol 10.67 mt 7.19 il 2.13	Petermann Island, Weddell quad- rant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Gabb	

ORDER 6. LENDOFELIC. NORGARE. (C. I. P. W., 1902.)

SUBRANG 2. DOPOTASSIC. FERGUSOSE. (C. I. P. W., 1902.)

1	II."6.1.2".	or 55.60 ac 14.32 ab 5.76 ns 0.85 ne 11.36 di 8.34 wo 0.58 il 1.22 ap 0.34	Bean Creek, Bearpaw Moun- tains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., II, p. 192, 1896.	Tinguaite.	In W. T., p. 295.
2	II(III)."6.1(2). 2(3).	or 45.04 di 23.86 ab 3.67 ol 1.25 an 3.89 mt 8.12 ne 11.36 il 0.46 ap 0.34	Shonkin Creek, Highwood Moun- tains, Montana.	E. B. Hurlbut.	L. V. Pirsson, U. S. G. S. B. 237, p. 74, 1905.	Fergusite.	In W. T., p. 293.
3	II".6.1.2.	or 48.93 di 14.47 an 0.56 ol 6.16 lc 5.67 mt 6.03 ne 11.08 il 2.28 hm 2.72 ap 1.68	Gaussberg, K. Wilhelm II Land, Antarctica.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (1), p. 81, 1906.	Leucite basalt.	
4	II(III).6.1(2).2.	or 47.82 di 15.12 an 3.89 ol 6.58 lc 3.49 mt 6.96 ne 9.09 il 1.98 hm 2.08 ap 1.34	Gaussberg, K. Wilhelm II Land, Antarctica.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (1), p. 81, 1906.	Leucite basalt.	

SUBRANG 3. SODIPOTASSIC. JUDITHOSE. (C. I. P. W., 1902.)

1	II.6.1.3(4).	or 38.36 ac 2.77 ab 15.72 di 4.52 ne 23.00 ol 10.55 mt 0.46 ap 3.70	Altona Township, Clinton County, New York.	E. W. Morley.	H. P. Cushing, B. G. S. A., IX, p. 248, 1898.	Syenite porphyry.	In W. T., p. 295.
2	(I)II.6.1.3".	or 46.70 di 2.75 ab 14.15 wo 3.83 ne 22.72 mt 6.96 he 0.82	Neasch's gully, Magnet Cove, Arkansas.	J. F. Williams.	J. F. Williams, Ign. R. Ark., p. 287, 1891.	Leucite tinguaite.	In W. T., p. 293.
3	(I)II."6.1."3.	or 54.49 ac 9.24 ab 13.62 di 4.02 ne 13.63 wo 0.81 mt 0.46 il 0.46	Cone Butte, Judith Moun- tains, Montana.	L. V. Pirsson.	Weed and Pirsson, A. J. S., II, p. 192, 1896.	Tinguaite.	Also in U. S. G. S. A. R. 18 (III), p. 569, 1898. In W. T., p. 293.
4	(I)II.6(7).1.3(4).	or 44.48 di 8.45 ab 9.96 wo 1.16 ne 30.39 mt 2.55 il 1.22 ap 0.34	Leancoie, Ice River, British Columbia.	M. F. Connor.	J. A. Allan, pers. com.	Nephelite syenite.	

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. LARDALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5	53.23	13.81	7.11	2.30	1.88	2.35	6.16	6.67	3.81		2.27	0.34	0.28	SO ₃ 0.21 Cl trace	100.42	2.66
A2. II	.887	.135	.044	.032	.047	.042	.099	.071			.029	.002	.004			
6	50.33	16.40	5.48	3.11	2.64	3.49	6.15	6.07	3.02		2.53	0.75		Cl trace FeS ₂ 0.16	100.13	2.615
A2. II	.839	.161	.034	.043	.066	.063	.099	.065			.031	.005				
7	57.00	16.06	5.55	3.22	0.64	1.51	8.00	6.18	2.10		0.39			Cl 0.45	101.08	
B3. IV	.950	.157	.034	.044	.016	.027	.129	.066			.005					
8	52.88	14.44	6.72	4.56	1.68	3.80	4.78	7.09	4.00			0.11			100.06	
v3. III	.881	.142	.042	.064	.042	.068	.077	.076				.001				

RANG 1. PERALKALIC. LARDALASE.

1	57.88	14.80	5.86	3.71	none	2.71	9.12	3.06	0.90	0.23	1.23	trace	0.15	ZrO ₂ none SO ₃ none Cl none	99.65	2.772
A2. II	.965	.145	.037	.051	—	.048	.147	.133			.015	—	.002			
2	56.90	16.34	3.61	5.72	0.22	2.21	8.10	4.96	1.10	0.08	1.09	0.17	trace	Cl trace	100.50	2.783
A2. II	.948	.160	.023	.079	.005	.035	.131	.053			.014	.001	—			
3	55.79	15.76	1.60	7.56	0.41	3.70	7.72	4.34	0.18	0.34	1.81	0.36		Cl none	99.71	2.766
A2. II	.930	.154	.010	.105	.010	.066	.124	.046			.023	.003				
4	54.58	20.43	2.08	3.39	trace	1.56	10.70	5.74	1.02	0.12	0.62	trace	trace		100.24	2.698
A3. III	.905	.200	.013	.047	—	.028	.173	.061			.008	—	—			
5	53.74	14.02	10.63	1.71	trace	1.18	9.02	4.77	3.40		0.50	none	0.36	ZrO ₂ 1.63	100.96	2.67
B2. III	.896	.137	.066	.024	—	.021	.145	.051			.006	—	.005			
6	53.71	15.37	3.28	5.72	1.58	5.20	6.84	4.11	0.45	0.33	3.40	0.52	0.14		100.65	2.697
A2. II	.895	.151	.021	.079	.040	.093	.110	.044			.043	.004	.002			
7	53.53	19.69	5.09	2.83	none	1.87	9.61	5.23	0.34	0.25	0.44	0.31	0.24	CO ₂ 0.40 Cl 0.04	99.87	2.751
A2. II	.892	.193	.032	.039	—	.034	.155	.055			.005	.002	.003			
8	53.44	18.64	9.38	0.86	none	0.79	12.10	2.43	1.12	0.34	0.30	none	0.10	ZrO ₂ 1.00 Cl 0.12	100.62	2.834
A2. II	.891	.183	.059	.012	—	.014	.195	.026			.004	—	.001			
9	53.01	15.33	9.14	4.44	0.10	0.67	11.86	2.60	1.88	0.20	0.33	trace	0.13	ZrO ₂ 0.65 SO ₃ none Cl 0.23	100.57	2.844
A2. III	.884	.150	.057	.062	.003	.012	.191	.028			.004	—	.002			
10	49.64	13.74	7.10	4.97	1.58	4.88	6.33	4.42	0.81	0.14	4.25	1.57	0.03	BaO 0.21	99.67	2.892
A2. II	.828	.135	.044	.069	.040	.088	.102	.047			.054	.011	—			

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBBRANG 3. SODIOTASSIC. JUDITHOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	II''(5)6.1.3.	or 39.48 ac 16.17 ab 15.20 di 7.56 ne 9.94 ol 1.12 mt 0.70 il 4.41 hm 0.96 ap 0.67	Michelsberg, Katzenbuckel, Odenwald.	O. N. Heidenreich.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 315, 1907.	Hornblende tinguaite.	
6	II.6.1.3(4).	or 36.14 ac 1.39 ab 18.86 di 9.94 ne 17.04 ol 1.40 mt 2.78 il 4.71 hm 3.04 ap 1.68	Michelsberg, Katzenbuckel, Odenwald.	O. N. Heidenreich.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 315, 1907.	Mica tinguaite.	
7	II.''6.1.3(4).	or 36.70 ac 14.78 ab 23.58 di 6.50 ne 13.06 ol 1.91 hl 0.70 mt 0.46 il 0.76	Logans Point, Signal Hill, Dunedin, New Zealand.	C. A. Cotton.	C. A. Cotton, Tr. N. Z. Inst., XLI, p. 118, 1909.	Phonolite.	
8	II.(5)6.1.3.	or 42.26 ac 5.08 ab 14.93 di 14.97 ne 10.65 ol 0.83 mt 7.19 ap 0.34	Puketeraki, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 405, 1906.	Leucitophyre.	

SUBBRANG 4. DOSODIC. LARDALOSE. (C. I. P. W., 1902.)

1	II.(5)6.1.4.	or 18.35 ac 16.17 ab 41.92 di 8.93 ne 9.09 wo 1.39 mt 0.46 il 2.28	North Siorarsuit, Ilmausak region, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 124, 1911.	Pulaskite.	
2	II.6.1.''4.	or 29.47 ac 11.09 ab 30.39 di 8.52 ne 13.92 ol 3.47 il 2.13	Akuliarusek, Igaliko Fjord, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 279, 1911.	Hedrumite.	
3	II.''6.1.4.	or 25.58 ac 4.62 ab 33.80 ns 0.73 ne 12.35 ol 13.89 ol 4.17 il 3.50 ap 1.01	Kangerdluarsuk, Ilmausak region, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 190, 1911.	Augite syenite.	
4	''II.6(7).1.4.	or 33.92 ac 6.01 ab 16.77 ns 2.56 ne 30.39 di 6.95 ol 1.12 il 1.22	Akuliarusek, Igaliko Fjord, Greenland.	C. Winther.	N. W. Ussing, G. Julhb., p. 275, 1911.	Nephelite porphyry.	
5	II(III).6.1.(3)4.	or 28.36 ac 27.26 ab 16.77 di 3.97 ne 15.34 wo 0.58 Z 2.38 mt 1.62 il 0.91	Laxefjaeld, Kangerdluarsuk, Greenland.	N. V. Ussing.	N. V. Ussing, G. Julhb., p. 168, 1911.	Aegirite lujavrite.	Incomplete in Rosenbusch, Elemente, p. 126, 1898. In W. T., p. 295.
6	II.''6.1.4.	or 24.46 ac 1.39 ab 34.58 di 13.60 ne 11.64 wo 2.32 mt 4.15 il 6.54 ap 1.34	Niakornarsuk, Korok Fjord, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 243, 1911.	Augite syenite.	
7	''II.6''.1.4.	or 30.58 ac 7.85 ab 22.53 di 4.71 ne 26.98 wo 0.93 mt 3.48 il 0.76 ap 0.67	Korok, Igaliko region, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 235, 1911.	Foyaite.	
8	II.6(7).1.4(5).	or 14.46 ac 17.56 ab 32.49 wo 1.63 ne 26.98 mt 1.86 hl 0.35 hm 2.08 Z 1.46 il 0.61	Tupersuatsiak, Ilmausak region, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 169, 1911.	Aegirite lujavrite.	
9	II(III).6(7).1.4.	or 15.57 ac 26.33 ab 23.06 ns 1.46 ne 22.15 di 2.97 Z 1.65 ol 4.83 il 0.61	Lille Elv, Kangerdluarsuk, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 175, 1911.	Arfvedsonite lujavrite.	
10	II(III).(5)6.1.(3)4.	or 26.13 ac 6.47 ab 27.77 di 8.64 ne 9.94 wo 1.39 il 8.21 hm 2.40 ap 3.70	Mount Hatten, Ilmausak region, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 220, 1911.	Porphyry.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. LARDALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
11	47.79	16.88	4.66	5.92	1.51	5.58	7.76	3.26	1.17	0.14	3.82	0.76	trace	CO ₂ none Cl none	99.25	2.921
B2. III	.797	.166	.029	.082	.038	.100	.125	.035			.048	.005	—			
12	55.68	20.39	2.10	1.95	0.80	1.92	9.18	5.34	1.50		0.60	0.06	0.31		99.83	
A2. II	.928	.200	.013	.027	0.20	.034	.148	.056			.008	—	.004			
13	52.03	20.58	3.40	1.98	0.27	2.46	8.63	5.46	4.83			0.07	0.13	CO ₂ 0.26	100.57	2.55
A2. II	.867	.202	.021	.028	.007	.044	.139	.058	.047			—	.002			
14	54.04	20.27	4.66	0.64	0.16	2.75	8.56	6.79	1.93						99.80	
A3. III	.901	.198	.029	.009	.004	.049	.138	.072								
15	54.42	20.76	2.64	1.33	0.22	1.34	10.41	4.89	2.50	0.22	0.40	0.11	0.15	ZrO ₂ 0.15 Cl 0.23 S 0.01 Cr ₂ O ₃ none NiO none BaO 0.04 SrO trace Li ₂ O trace	99.82	2.559
A1. I	.907	.203	.016	.018	.006	.024	.168	.053			.005	.001	.002			
16	57.46	18.41	2.40	1.28	none	4.02	9.23	4.93	1.12	0.45	0.42	0.11	0.11	SO ₃ 0.50 Cl 0.23 S 0.05	100.72	
A2. II	.958	.180	.015	.018	—	.071	.148	.052			.005	.001	.002			
17	47.61	14.26	4.90	4.07	2.62	8.71	6.70	4.08	1.89	0.26	1.38	1.38	0.30	ZrO ₂ 0.18 SO ₃ 1.17 Cl 0.37 F trace S 0.03 Cr ₂ O ₃ trace NiO trace BaO 0.41 SrO 0.36 Li ₂ O trace	100.68	2.79
A1. I	.793	.140	.031	.057	.066	.155	.108	.043			.017	.010	.004			
18	55.90	19.00	2.05	2.54	1.10	3.12	8.49	5.41	n. d.		1.45		0.28		99.34	2.642
A3. III	.932	.186	.013	.035	.028	.055	.137	.058			.018		.004			
19	59.88	17.87	2.67	1.50	1.04	2.01	7.96	5.69	0.90		0.85	0.32	trace		100.69	
A2. II	.988	.175	.017	.021	.026	.036	.128	.061			.011	.002	—			
20	56.58	19.89	3.18	0.56	0.13	1.10	10.72	5.43	1.77				0.47		99.83	
A3. III	.943	.195	.020	.008	.003	.020	.173	.058					.007			
21	55.65	20.06	3.45	1.25	0.78	1.45	8.99	6.07	1.51						99.21	
B3. IV	.928	.197	.022	.017	.020	.026	.145	.065								
22	56.35	19.85	1.91	2.03	1.17	2.60	8.89	5.31	0.70		1.00	0.67	0.20		100.68	
A2. II	.939	.195	.012	.028	.029	.046	.148	.056			.013	.005	.003			
23	54.55	19.07	2.41	3.12	1.98	3.15	7.67	4.84	0.72		1.40	0.74	0.17		99.82	
A2. II	.909	.187	.015	.043	.050	.056	.124	.051			.018	.005	.002			
24	53.81	19.69	6.20	3.63	0.85	1.73	7.77	4.58	1.52						99.78	
A3. III	.897	.193	.039	.050	.021	.031	.125	.049								

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBBRANG 4. DOSODIC. LARDALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
11	II.6.1.4.⊙	or 19.46 di 9.45 ab 26.72 wo 4.18 an 1.67 mt 6.73 ne 21.02 il 7.30 ap 1.68	Lake Tasek, Narsak, Ilmausak region, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 216, 1911.	Trachy- dolerite.	
12	(I)II.6.1.4.	or 31.14 ac 1.85 ab 29.34 di 6.80 ne 24.99 wo 0.46 mt 3.02 il 1.22	Brome Mountain, Quebec.	M. F. Connor.	J. A. Dresser, A. J. S., XVII, p. 355, 1904.	Nephelite syenite.	Also in Can. G. S. A. R. XVI (1904), p. 13, G, 1906.
13	(I)II.6''.1.4.	or 32.25 di 3.75 ab 21.74 wo 3.83 an 1.39 mt 4.87 ne 27.69	Heron Bay, Lake Superior, Ontario.	A. H. A. Rob- inson.	A. P. Coleman, Rep. Bur. Min. Ont., IX, p. 189, 1900.	Heronite.	Not in W. T.
14	(I)II.6''.1.(3)4.	or 40.03 ac 5.56 ab 15.20 di 0.86 ne 27.55 wo 5.22 mt 2.09 hm 1.8	Magnet Cove, Arkansas.	R. N. Brackett.	J. F. Williams, Ign. R. Ark., p. 287, 1891.	Leucite tinguaite.	In W. T., p. 295.
15	(I)II.6(7).1.4.	or 29.47 ac 7.39 ab 23.32 ns 0.24 ne 29.96 di 5.02 wo 0.35 il 0.76	Between Black and Big Mountains, Uvalde County, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 62, 1900.	Phonolite.	In W. T., p. 295.
16	''II.6.1.4.	or 28.91 ac 5.08 ab 35.63 di 2.23 ne 17.04 wo 6.61 hl 0.35 mt 0.93 th 0.85 il 0.76 ap 0.34	Black Buttes, Sundance quadrangle, Wyoming.	G. Steiger.	W. S. T. Smith, U. S. G. S. Fol. 127, p. 7, 1905.	Phonolite.	
17	II(III).6.1.4.	or 23.91 di 17.48 ab 19.39 wo 3.94 an 2.50 mt 7.19 ne 14.48 il 2.58 hl 0.59 ap 3.36 th 2.13	Two Buttes, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 148, p. 182, 1897.	Tinguaite.	In W. T., p. 295.
18	II.6.1.''4.	or 32.25 ac 4.16 ab 25.15 di 10.26 ne 22.72 wo 1.16 mt 0.93 il 2.74	Foia, Portugal.	G. Pajkull.	Kraatz-Koschlau and Hackmann, T. M. P. M., XVI, p. 262, 1896.	Mica tinguaite.	In W. T., p. 295.
19	''II.(5)6.1.(3)4.	or 33.92 ac 6.47 ab 37.73 di 6.45 ne 11.93 ol 0.31 mt 0.70 il 1.67 ap 0.67	Sundet, Asrum Lake, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 190, 1899.	Hedrumite.	In W. T., p. 295.
20	(I)II.6.1.4.	or 32.25 ac 9.24 ab 24.63 ns 1.95 ne 25.56 di 4.37 wo 0.23	Asbjørnsrød, Hedrum Parish, Lougendal, Norway.	G. Pajkull.	W. C. Brögger, Z. K., XVI, p. 41, 1890.	Tinguaite.	Border of dike. Also in Eg. Kg., I, p. 113, 1894. In W. T., p. 295.
21	(I)II.6.1.''4.	or 36.14 ac 6.01 ab 22.01 di 5.88 ne 25.56 ol 0.14 mt 2.09	Asbjørnsrød, Hedrum Parish, Lougendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 191, 1894.	Tinguaite.	Center of dike. In W. T., p. 295.
22	(I)II.6.1.4.	or 31.14 ac 1.85 ab 32.22 di 6.48 ne 22.01 ol 0.80 mt 1.86 il 1.98 ap 1.68	Near Pollen, Farrisvand, Lougendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 19, 1899.	Laurdalite.	In W. T., p. 295.
23	''II.6.1''4.	or 28.36 di 5.99 ab 34.06 ol 2.67 an 3.34 mt 3.48 ne 16.76 fl 2.74 ap 1.68	Löve, Lougendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 19, 1899.	Laurdalite.	In W. T., p. 295.
24	(I)II.''6.1(2).4.	or 27.24 di 2.72 ab 36.68 ol 1.3 an 5.28 mt 9.05 ne 15.62	Stoksund, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 116, 1890.	Syenite pegmatite.	In W. T., p. 297.

CLASS II. DOSALANE—Continued.

RANG I. PERALKALIC. LARDALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
25	51.95	14.95	4.09	5.70	3.54	6.10	5.43	4.45	1.10		1.95	1.15	0.30		100.71	
A2. II	.866	.147	.026	.079	.089	.109	.088	.048			.024	.008	.004			
26	45.16	15.26	9.57	4.99	3.18	2.87	6.57	3.87	n. d.		6.98	1.54	0.63		100.62	
A2. II	.753	.150	.060	.069	.080	.052	.106	.041			.087	.011	.009			
27	57.78	15.45	3.06	3.11	1.13	1.72	11.03	2.89	0.94		1.83		0.98		99.92	2.67— 2.70
A2. II	.963	.151	.019	.043	.028	.031	.177	.031			.023		.014			
28	53.80	15.17	7.11	3.09	1.08	1.72	10.55	5.09	1.31				1.09		100.01	
A3. III	.897	.149	.044	.043	.027	.031	.170	.054					.016			
29	53.68	18.42	5.91	2.57	0.88	2.05	9.46	4.92	0.89		1.35		0.75		100.40	
A2. II	.895	.180	.037	.036	.022	.037	.153	.052			.017		.011			
30	53.67	16.79	6.57	2.53	1.74	2.47	9.07	4.14	0.34		1.96		0.11		100.40	
A2. II	.895	.165	.041	.035	.044	.045	.147	.044			.025		.002			
31	53.50	16.44	8.72	1.48	1.05	1.50	9.98	4.58	1.76		0.86		0.47		100.34	
A2. II	.892	.161	.054	.021	.026	.027	.161	.049			.011		.007			
32	55.10	19.25	2.77	1.66	0.83	5.14	7.41	4.68	2.19	0.40	0.48	0.41	0.32	CO ₂ 0.22	100.86	2.544
A2. II	.918	.189	.017	.023	.021	.062	.120	.050			.006	.003	.005			
33	54.05	21.06	0.41	3.90	0.86	2.80	9.67	4.18	1.03	0.33	none	none	1.91	SO ₂ 0.48 Cl 0.25	100.96	2.630
B2. III	.901	.206	.003	.054	.022	.050	.156	.044			—	—	—			
34	50.10	19.90	4.02	1.98	0.90	4.04	8.61	5.94	2.07		1.14	0.63	0.38	CO ₂ trace SO ₂ 0.94 Cl trace	100.65	
A2. II	.835	.195	.025	.028	.023	.072	.139	.063			.014	.004	.005			
35	51.60	19.81	2.24	5.48	2.17	3.95	8.20	5.24	0.58					Cl 0.43	99.70	2.58
A3. III	.860	.194	.014	.076	.054	.071	.132	.055								
36	52.47	15.84	3.30	8.42	1.52	5.05	7.03	2.52	1.94		1.57	0.14		Cl none	100.01	2.766
A2. II	.875	.155	.021	.117	.038	.090	.113	.027			.020	.001				
37	48.23	18.41	3.27	5.00	1.92	6.43	7.77	3.16	3.05		1.90	0.47	trace	CO ₂ 0.41 S 0.12	100.14	2.670
A2. II	.804	.180	.020	.069	.048	.114	.126	.034			.028	.003	—			
38	54.24	20.84	2.26	2.09	1.21	2.99	9.22	3.84	1.89	1.24	0.51		0.15		100.48	
A2. II	.904	.204	.014	.029	.030	.054	.148	.040			.006		.002			
39	55.15	20.50	1.84	1.73	0.55	0.55	11.00	4.91	2.25		0.34		0.59	Cl 0.49	99.90	
A2. II	.919	.201	.012	.024	.014	.010	.177	.052			.004		.008			

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 4. DOSODIC. LARDALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
25	II''.(5)6.1''.(3)4.	or 26.13 di 15.66 ab 27.77 ol 5.17 an 3.34 mt 6.03 ne 9.94 il 3.65 ap 2.69	Hað, Langesund Fjord, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 139, 1899.	Soda minette.	In W. T., p. 297.
26	II''.6.1.4.	or 22.80 di 0.65 ab 30.92 ol 5.46 an 0.33 il 11.86 ne 13.35 ap 3.70 pf 1.22	Lysebofjord, Lardal, Norway.	P. Schei and L. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 19, 1899.	Olivine laurdalite.	In W. T., p. 297.
27	II.(5)6.1.4.	or 17.24 ac 8.78 ab 43.23 ns 4.64 ne 10.65 di 7.24 ol 3.64 il 3.50	Tuoljlucht, Umppek, Kola, Finland.	H. Berghell.	V. Hackmann, Fennia, XI, No. 2, p. 139, 1894.	Nephelite syenite (lujavrite).	In W. T., p. 253.
28	II(III).6''.1.(3)4.	or 30.02 ac 20.33 ab 11.53 ns 3.78 ne 20.73 di 7.15 ol 5.14	Angwundast- schorr, Lujavr-Urt, Kola, Finland.	H. Blankett.	W. Ramsay, Fennia, XV, No. 2, p. 16, 1898.	Lampro- phyllite lujavrite.	Not in W. T.
29	II.6''.1.4.	or 28.91 ac 11.55 ab 19.91 di 8.53 ne 25.56 ol 0.24 mt 2.78 il 2.58	Tsutsknjun, Lujavr-Urt, Kola, Finland.	W. Peterssen.	W. Ramsay, Fennia, XV, No. 2, p. 16, 1898.	Eudialyte lujavrite.	"ZrO ₂ in TiO ₂ ." Not in W. T.
30	II.6.1.4.⊙	or 24.46 ac 12.01 ab 25.68 di 9.50 ne 20.45 wo 0.12 mt 2.78 il 3.80 hm 0.48	Angwundast- schorr, Lujavr-Urt, Kola, Finland.	H. Berghell.	W. Ramsay, Fennia, XV, No. 2, p. 16, 1898.	Eudialyte- lampro- phyllite lujavrite.	Not in W. T.
31	II''.6(7).1.4.	or 27.24 ac 22.64 ab 15.46 di 6.12 ne 23.42 ol 0.87 mt 1.16 il 1.67	Angwundas, Lujavr-Urt, Kola, Finland.	A. Ziliacus.	W. Ramsay, Fennia, XV, No. 2, p. 16, 1898.	Aegirite lujavrite.	Not in W. T.
32	(I)II.6.1(2).4.	or 27.80 di 4.54 ab 33.54 wo 4.37 an 5.28 mt 3.94 ne 15.90 il 0.91 ap 1.01	Mädstein, n. Neschwitz, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 98, 1894.	Phonolite.	In W. T., p. 297.
33	(I)II.6''.1''.4.	or 24.46 di 8.08 ab 29.60 ol 3.63 an 4.45 mt 0.70 ne 25.42 hl 0.47 th 0.85	Hohe Riese, n. Radelstein, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XXIV, p. 237, 1905.	Phonolite.	MnO high. Not used in calc. norm.
34	''II.6(7).1''.4.	or 35.03 di 4.97 ab 15.20 wo 3.60 an 1.39 mt 4.41 ne 27.83 il 2.13 th 1.70 hm 0.96 ap 1.34	Tachaberg, Polzen District, Bohemia.	K. H. Schleu- mann.	K. H. Schleumann, Abh. Sachs. Ges. W., XXXII, p. 757, 1913.	Hauyne phonolite.	
35	II.6(7).1''.4.	or 30.58 di 13.52 ab 14.15 ol 5.05 an 3.61 mt 3.25 hl 0.70	Eruption of 1906, Mount Vesuvius.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4), IX, p. 45, 1907.	Volcanic glass.	Dikelet in leucite- tephrite.
36	II''.6.1(2).4.	or 15.01 di 17.09 ab 38.25 ol 3.84 an 4.17 mt 4.87 ne 11.36 il 3.04 ap 0.34	Soca, Madeira Island.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 399, 1912	Essexite.	
37	II.6(7).1(2).4.	or 18.90 di 15.57 ab 20.44 wo 1.74 an 5.56 mt 4.84 ne 24.71 il 4.26 ap 1.01	Barranca del Almendero, Madeira Island.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 415, 1912.	Sodalite gauteite.	Fresh?
38	(I)II.6.1''.4.	or 22.24 di 8.53 ab 33.80 ol 0.24 an 4.45 mt 3.25 ne 23.71 il 0.91	Anaga Mountains, n. Mercedes, Teneriffe, Canary Islands.	N. Sahlbom.	H. Preiswerk, N. J. Cb., 1909, p. 396.	Phonolite.	Also in Vh. Nf. Ges. Basel, XXI, p. 210, 1910.
39	(I)II.6''.1.4.	or 28.91 ac 5.54 ab 28.30 ns 1.10 ne 26.98 di 2.38 hl 0.82 ol 2.91 il 0.61	Rouma, Los Islands, French Guinea.	Pisani.	A. Lacroix, Nouv. Arch. Mus., III, p. 38, 1911.	Nephelite syenite.	Also in B. Soc. Fr. Min., XXXV, p. 21, 1912.

CLASS II. DOSALANE—Continued

RANG 1. PERALKALIC. LARDALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
40	54.75	19.90	4.00	1.64	0.52	0.18	11.30	2.82	3.38		0.35		0.72	ZrO ₂ 0.26	99.82	
A2. II	.913	.195	.025	.023	.013	.003	.182	.030			.004		.010			
41	60.1	18.4	1.8	2.5	0.3	1.4	9.1	5.2	1.2		0.5			Cl 0.1	100.6	
B3. IV	1.002	.180	.011	.035	.008	.025	.147	.055			.006					
42	57.5	17.8	4.7	1.4	0.2	1.3	9.0	4.5	3.0		none			Cl 0.4	99.8	
B3. IV	.958	.175	.029	.019	.005	.023	.145	.048			—					
43	56.5	18.5	4.4	0.7	0.2	0.9	10.2	4.6	3.5		none			Cl 0.4	99.9	
B3. IV	.942	.181	.028	.010	.005	.016	.165	.049			—					
44	52.48	19.28	4.00	2.93	1.34	4.01	8.66	4.91	1.17	0.29	0.66	trace	0.48	SO ₃ 0.80	101.01	
B2. III	.875	.189	.025	.040	.034	.071	.140	.052			.008	—	.007			
45	57.81	18.74	5.76	0.42	trace	1.28	9.35	4.52	1.50				trace		99.38	2.64
B3. IV	.964	.184	.036	.005	—	.023	.151	.048					—			
46	53.98	19.43	4.39	2.05	1.07	2.04	8.81	5.27	1.66	0.13	0.57	0.30	0.26		99.96	
A2. II	.899	.190	.028	.029	.027	.037	.142	.056			.007	.002	.004			
47	53.80	18.46	6.22	0.40	1.05	2.53	7.09	5.46	3.54	0.85	0.31	0.53	0.33		100.57	
A3. III	.897	.181	.039	.006	.026	.045	.115	.058			.004	.004	.005			
48	55.32	19.59	1.92	3.12	1.11	2.72	8.73	5.09	1.05		0.59	0.42	trace	ZrO ₂ 0.33 SO ₃ 0.26	100.25	2.640
A2. II	.922	.192	.012	.043	.028	.048	.140	.054			.007	.003	—			
49	54.94	19.34	1.80	4.52	1.11	2.05	8.39	5.93	0.32		0.67	0.18	trace	ZrO ₂ 0.38 SO ₃ 0.27	99.90	2.584
A2. II	.916	.190	.011	.063	.028	.037	.135	.063			.008	.001	—			
50	54.30	19.71	2.23	4.21	1.19	2.08	8.29	6.15	0.32		0.80	0.15		ZrO ₂ 0.48 S 0.10	100.01	2.551
A2. II	.905	.193	.014	.058	.030	.038	.134	.065			.010	.001				
51	54.20	19.38	3.83	2.14	1.35	2.15	8.01	5.28	1.04		0.79	0.58	trace	ZrO ₂ 0.47 SO ₃ 0.31	99.53	2.607
A2. II	.903	.190	.024	.029	.034	.039	.129	.056			.010	.004	—			
52	53.44	20.39	4.22	1.76	1.12	2.13	8.76	5.75	0.97		0.69	0.49	trace	ZrO ₂ 0.27 SO ₃ 0.22	100.21	2.590
A2. II	.891	.200	.026	.025	.028	.038	.141	.062			.009	.003	—			
53	52.78	19.08	3.63	3.79	1.58	5.09	7.95	3.85	0.44		1.50	0.63	trace	CO ₂ 0.10 Cl 0.33	100.75	
A2. II	.880	.187	.023	.053	.040	.091	.128	.041			.019	.004	—			
54	55.45	17.80	5.90	0.72	0.14	1.90	9.71	4.69	2.64		1.13			Cl 0.72	100.80	
A3. III	.924	.175	.037	.010	.004	.034	.156	.050			.014					

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBBRANG 4. DOSODIC. LARDALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
40	(I)II.6.1.4".	or 16.68 ac 7.85 ab 40.87 di 0.71 ne 24.71 ol 2.76 Z 0.37 mt 1.86 il 0.61	Rouma, Los Islands, French Guinea.	Pisani.	A. Lacroix, Nouv. Arch. Mus., III, p. 38, 1911.	Nephelite syenite porphyry.	Also in B. Soc. Fr. Min., XXXV, p. 21, 1912.
41	(I)II."6.1.4.	or 30.58 ac 5.08 ab 40.87 ns 1.34 ne 13.35 di 6.01 ol 1.16 il 0.91	Gebel Abu-Khrug, East of Nile, Egypt.	J. Couyat.	J. Couyat, C. R., CLI, p. 1140, 1910.	Nephelite syenite.	
42	(I)II.(5)6.1.4.	or 26.69 ac 5.54 ab 44.27 di 1.57 ne 12.07 wo 1.86 hl 0.70 mt 3.94	Gebel Hadarba, East of Nile, Egypt.	J. Couyat.	J. Couyat, C. R., CLI, p. 1140, 1910.	Phonolite.	
43	"II.6.1.4.	or 27.24 ac 12.47 ab 31.70 di 2.32 ne 20.30 wo 0.23 hl 0.70 mt 0.23	Gebel Hadarba, East of Nile, Egypt.	J. Couyat.	J. Couyat, C. R., CLI, p. 1140, 1910.	Microsyenite.	
44	"II.6.1.4.	or 28.91 di 9.08 ab 25.58 wo 2.67 an 1.95 mt 5.80 ne 23.86 il 1.22 th 1.42	Near Kadero, Kordofan.	D. Schimpff.	G. Linck, N. J. B. B., XVII, p. 440, 1903.	Tinguaite.	
45	(I)II.6.1.4.	or 26.69 ac 6.93 ab 41.92 wo 2.67 ne 15.90 mt 1.16 hm 2.56	Edda Gijorgis, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 269, 1900.	Tinguaite.	In W. T., p. 297
46	"II.6.1.4.	or 31.14 ac 3.70 ab 26.46 di 6.64 ne 23.71 ol 0.14 mt 4.64 il 1.06 ap 0.67	Teleki Valley, Kenia Volcano, British East Africa.	G. T. Prior.	G. T. Prior, Min. Mag., XIII, p. 247, 1903.	Kenyte.	
47	(I)II."6.1."4.	or 32.80 di 5.40 ab 32.49 mt 1.62 an 1.95 il 0.61 ne 15.05 hm 5.12 ap 1.34	Mount Höhnel, Kenia Volcano, British East Africa.	G. T. Prior.	G. T. Prior, Min. Mag., XIII, p. 247, 1903.	Kenyte.	Iron oxides? Fresh?
48	"II.6.1.4.	or 30.02 ac 0.92 ab 30.13 di 8.85 ne 22.96 ol 1.31 mt 2.32 il 1.06 ap 1.01	Kibo, Kilimanjaro, German East Africa.	Eyme.	L. Finckh, Rosenb. Fests., p. 392, 1906.	Rhomben porphyry.	ZrO ₂ ?
49	"II.6.1.' 4.	or 35.03 ac 3.70 ab 20.96 di 8.04 ne 24.71 ol 4.18 mt 0.70 il 1.22 ap 0.34	Kibo, Kilimanjaro, German East Africa.	Eyme.	L. Finckh, Rosenb. Fests., p. 392, 1906.	Katophorite trachyte.	ZrO ₂ ?
50	(I)II.6".1."4.	or 36.14 ac 2.77 ab 19.39 di 8.20 ne 25.84 ol 3.07 mt 1.86 il 1.52 ap 0.34	Kibo, Kilimanjaro, German East Africa.	Eyme.	L. Finckh, Rosenb. Fests., p. 392, 1906.	Trachy- dolerite glass.	ZrO ₂ ?
51	(I)II.6.1.4.	or 31.14 di 4.54 ab 33.01 ol 0.84 an 1.39 mt 4.41 ne 18.74 il 1.52 hm 0.80 ap 1.34	Kibo, Kilimanjaro, German East Africa.	Klüss.	L. Finckh, Rosenb. Fests., p. 392, 1906.	Leucite rhomben porphyry.	ZrO ₂ ?
52	(I)II.6".1.4.	or 34.47 ac 1.39 ab 23.06 di 6.05 ne 26.70 mt 3.71 il 1.37 hm 1.12 ap 1.01	Kibo, Kilimanjaro, German East Africa.	Klüss.	L. Finckh, Rosenb. Fests., p. 392, 1906.	Leucite rhomben porphyry.	ZrO ₂ ?
53	II.6(7).1(2).4.	or 22.90 di 11.37 ab 30.13 wo 1.16 an 5.00 mt 5.34 ne 20.02 il 2.89 ap 1.34	Meru Volcano, German East Africa.	B. Mauritz.	B. Mauritz, T. M. P. M., XXVII, p. 322, 1908.	Trachy- dolerite.	
54	"II.6.1.4.	or 27.80 ac 9.70 ab 33.54 di 0.86 ne 17.32 wo 3.02 hl 1.17 il 1.52 hm 2.56 pf 0.54	Paardefontein, Pretoria, Transvaal.	F. Pisani.	H. A. Brouwer, Transv. Nephsy., p. 91, 1910.	Tinguaite porphyry.	Center of dike.

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. LARDALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
55	53.73	20.35	3.74	2.13	0.47	2.72	7.94	6.05	2.02		0.09		0.51	Cl 0.23	99.98	
A2. II	.896	.199	.023	.030	.012	.048	.128	.065			.001		.007			
56	60.41	17.44	1.98	1.78	1.85	2.79	7.51	5.64	0.51						99.91	
A3. III	1.007	.171	.013	.025	.046	.050	.121	.060								
57	52.03	15.10	2.15	5.67	2.44	6.93	6.10	3.47	3.10		1.82	0.60			99.43	
A2. II	.868	.148	.014	.079	.061	.123	.098	.037			.023	.004				
58	55.82	20.19	3.70	1.17	0.25	1.02	9.57	5.60	1.30	0.15	0.01	0.07	0.36	CO ₂ 0.04 ZrO ₂ 0.09 SO ₃ 0.08 Cl 0.37 Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO trace SrO trace CuO 0.01 Ag, Au none Pt none	99.80	2.594
A1. I	.930	.198	.023	.017	.006	.018	.155	.060			—	—	.005			
59	53.80	18.72	4.99	3.59	0.86	2.80	8.82	5.20	1.90		0.30			Cl 0.14	101.12	
B3. IV	.897	.184	.031	.050	.022	.050	.142	.055			.004					
60	54.60	17.48	5.72	1.02	1.44	3.10	9.32	5.61	1.56		0.80				100.65	
A3. III	.910	.171	.036	.014	.036	.055	.150	.060			.010					
61	54.13	19.11	3.73	1.87	0.66	5.32	8.41	4.68	2.33						100.24	
A3. III	.902	.187	.023	.026	.017	.095	.135	.050								
62	55.47	20.67	2.83	1.86	1.43	3.43	8.33	4.86	0.12	0.08	1.32	0.03	0.02	SrO 0.01	100.46	
A2. II	.925	.203	.018	.026	.036	.061	.134	.052			.017	—	—			

RANG 1. PERALKALIC. LARDALASE.

1	56.64	16.10	4.90	6.86	none	0.39	11.50	1.00	1.54	0.04	0.30	none	0.57	SO ₃ none Cl trace Nb ₂ O ₅ 0.45	100.29	2.75
A2. II	.944	.158	.031	.095	—	.007	.185	.011			.004	—	.008			

RANG 2. DOMALKALIC. ESSEXASE. (C. I. P. W., 1902.)

1	50.24	18.43	2.54	5.65	3.65	7.83	2.45	7.45	0.36		1.19	0.47		CO ₂ none ZrO ₂ none SO ₃ none S none BaO 0.29 SrO trace	100.55	
A1. I	.838	.181	.018	.079	.091	.139	.040	.080			.015	.003				
2	54.83	19.59	1.66	3.04	1.49	4.05	2.92	10.40	0.77	0.49	0.73	0.17		CO ₂ none ZrO ₂ 0.01 S none BaO 0.15	100.30	
A2. II	.914	.192	.010	.042	.037	.072	.047	.111			.009	.001				
3	50.68	19.46	3.96	2.51	2.24	6.78	2.61	9.38	0.46	0.16	0.89	0.33		CO ₂ none ZrO ₂ trace SO ₃ none BaO 0.15 CuO none	99.61	
A2. II	.845	.191	.025	.035	.056	.121	.042	.100			.011	.002				
4	50.36	17.62	4.80	2.53	3.27	7.61	1.99	9.39	1.19		1.09	0.40			100.25	2.655
A2. II	.839	.173	.030	.035	.082	.136	.032	.100			.014	.003				
5	51.20	21.21	2.38	3.67	1.99	5.42	2.11	10.63	0.28	0.10	0.74	0.36		ZrO ₂ 0.03 SO ₃ trace BaO 0.33	100.45	
A2. II	.853	.208	.015	.051	.050	.096	.034	.113			.009	.003				

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBBRANG 4. DOSODIC. LARDALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
55	(I)II.6.1."4.	or 36.14 di 5.82 ab 22.79 wo 1.63 an 2.50 mt 5.34 ne 23.14 il 0.15 hl 0.35	Bet. Renseburg and Rustenburg, Zwart Kopjes, Transvaal.	E. A. Wülfing.	E. A. Wülfing, N. J., 1888, II, p. 32.	Nephelite syenite.	In W. T., p. 297.
56	"II.(5)6.1.(3).4.	or 33.36 ac 4.62 ab 36.15 di 11.11 ne 11.93 ol 2.19 mt 0.70	Tongging, Toba Lake, Sumatra.	W. Herz.	L. Milch, Z. D. G. G., LI, p. 70, 1899.	Trachyte-andesite.	In W. T., p. 297.
57	II.'"6.1"4.	or 20.57 di 22.23 ab 29.87 ol 0.48 an 3.61 mt 3.25 ne 11.64 il 3.50 sp 1.34	Vo-men-ko, East Yunnan, China.	Pisani.	J. Deprat, Mem. Ser. G. Indo-Ch., I (1), 1, p. 229, 1912.	Augite syenite.	
58	(I)II.6.1.4.	or 33.36 ac 7.85 ab 25.94 di 4.31 ne 23.71 ol 0.24 hl 0.68 mt 1.39	Minumurra River, Kiama, New South Wales.	J. C. H. Mingaye.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII, p. 41, 1905.	Tinguaite.	
59	II.6"1.4.	or 30.58 ac 5.08 ab 22.01 di 11.20 ne 24.19 wo 0.23 hl 0.23 mt 4.64 il 0.61	Signal Hill, Dunedin, New Zealand.	C. A. Cotton.	C. A. Cotton, Tr. N. Z. Inst., XLI, p. 121, 1909.	Phonolite.	
60	II.6(7).1.(3).4.	or 33.36 ac 16.63 ab 11.26 ns 0.37 ne 25.42 di 8.77 wo 1.74 il 1.52	Black Point, Rarotonga Island, Cook Islands.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., XLI, p. 99, 1909.	Phonolite.	
61	"II.6.1.4.	or 27.80 di 4.42 ab 28.30 wo 8.47 an 0.56 mt 5.34 ne 23.00	Gazelle Harbor, Kerguelen Island.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 64, 1908.	Phonolite.	
62	(I)II.6.1"4.	or 28.91 di 7.78 ab 30.39 wo 0.93 an 4.73 mt 2.99 ne 21.58 il 2.58 hm 1.44	Observation Hill, Ross Island, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 119, 1907.	Hornblende trachyte.	

SUBBRANG 5. PERSODIC. AGPAOSE. (H. S. WASHINGTON, 1917.)

1	II.'"6.1"5.	or 6.12 ac 14.32 ab 52.40 ns 0.85 ne 13.35 di 1.73 ol 9.38 il 0.61	Nunasarnak, Tunugdliarfik, Ilimausak region, Greenland.	C. Christensen.	N. V. Ussing, G. Julbb., p. 175, 1911.	Arivedsonite lujavrite (agpaité).	
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SUBBRANG 2. DOPOTASSIC. VICOSE. (H. S. WASHINGTON, 1906.)

1	II.6.2"2"2.	or 40.03 di 15.46 an 16.96 ol 5.74 lc 3.49 mt 3.71 ne 11.36 il 2.28 ap 1.01	Monte Cavallo, n. Orvieto, Italy.	H. S. Washington.	H. S. Washington, R. C. R., p. 101, 1906.	Leucite tephrite.	Incorrect in J. G., V, p. 370, 1897. In W. T., p. 297.
2	(I)II.(5)6."2.2.	or 61.72 di 7.98 ab 0.52 ol 1.97 an 9.45 mt 2.32 ne 13.06 il 1.52 ap 0.34	Monte Fogliano, Vico Volcano, n. Viterbo, Italy.	H. S. Washington.	H. S. Washington, R. C. R., p. 92, 1906.	Vicoite (leucite tephrite).	
3	II.6"2.2.	or 39.48 di 12.10 an 13.62 wo 1.04 lc 12.62 mt 5.80 ne 11.93 il 1.52 ap 0.67	Poggio Cotognola, n. Bracciano, Italy.	H. S. Washington.	H. S. Washington, R. C. R., p. 97, 1906.	Leucite tephrite.	
4	II.6(7).2.2.	or 35.03 di 17.71 an 11.40 wo 0.35 lc 16.13 mt 4.87 ne 9.09 il 2.13 hm 1.44 ap 1.01	Madonna del Riposo, Bracciano, Italy.	H. S. Washington.	H. S. Washington, R. C. R., p. 97, 1906.	Leucite tephrite.	
5	"II.6(7).2.2.	or 37.53 di 5.69 an 16.96 ol 4.22 lc 19.84 mt 3.48 ne 9.66 il 1.37 ap 1.01	Monte San Antonio, n. Rocca Monfina, Italy.	H. S. Washington.	H. S. Washington, R. C. R., p. 92, 1906.	Vicoite (leucite tephrite).	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. ESSEXASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	49.70	18.45	3.39	4.32	2.32	7.91	5.33	4.95	1.09	0.25	1.33	0.40	trace		99.44	
A2. II	.828	.181	.021	.060	.058	.141	.086	.053			.017	.003	—			
2	52.05	15.02	2.65	5.52	5.39	8.14	3.17	6.10	0.35		0.47	0.21	trace	SO ₂ 0.02 Cl 0.24 BaO 0.42 SrO 0.28	100.03	
A1. I	.868	.147	.017	.076	.135	.145	.051	.065			.006	.001	—			
3	51.94	15.78	4.07	3.17	3.48	6.04	3.44	7.69	2.17		0.39	0.59	trace	SO ₂ 0.29 Cl 0.08 BaO 0.42 SrO 0.28	99.83	
A1. I	.866	.155	.026	.044	.087	.108	.055	.082			.005	.004				
4	52.53	19.05	4.77	2.10	1.99	5.75	4.03	7.30	1.49	0.13	0.07	0.28	0.13	CO ₂ 0.27 BaO 0.09 SrO 0.19	100.17	2.719
A2. II	.876	.187	.030	.029	.050	.103	.065	.078			.001	.002	.002			
5	50.49	15.83	6.11	3.04	3.38	7.99	3.12	6.86	1.20	0.29	0.92	0.42	0.11	CO ₂ 0.07	99.83	2.849
A2. II	.842	.155	.038	.042	.085	.143	.050	.073			.012	.003	.002			
6	51.83	18.25	4.26	1.46	3.28	4.08	4.68	5.75	3.15	0.27	0.86	0.55	trace	CO ₂ 0.43 BaO 0.43 SrO 0.42	99.70	2.621
A2. II	.864	.179	.027	.020	.082	.073	.076	.062			.011	.004	—			
7	47.8	20.1	6.7	0.8	1.1	5.4	5.5	7.1	2.4		0.7		0.8	SO ₂ 0.4 BaO 0.8	99.3	
B2. III	.797	.197	.042	.011	.028	.096	.089	.075			.009		.012			
8	50.92	20.60	2.43	1.25	0.53	5.16	5.60	7.50	4.97		0.34	trace	0.36	SO ₂ 0.45 Cl 0.11	100.22	
A2. II	.849	.202	.015	.018	.013	.092	.090	.080			.004	—	.005			
9	52.24	18.53	2.71	4.63	3.96	8.49	2.99	6.17	0.45						100.17	2.73
A3. III	.871	.182	.017	.064	.099	.152	.048	.066								
10	53.50	20.05	1.10	2.48	2.54	5.42	5.32	8.02	0.50		0.33	0.15		Cl 0.36	99.77	
A2. II	.892	.196	.007	.035	.063	.096	.085	.085			.004	.001				
11	53.13	19.90	1.09	2.93	3.15	6.11	5.92	6.63	0.54		0.42	trace		Cl 0.33	100.15	
A2. II	.886	.195	.007	.040	.079	.109	.095	.070			.005	—				
12	52.20	19.21	1.20	3.25	3.34	6.55	5.75	6.65	1.00		0.84	trace		Cl 0.25	100.24	
A2. II	.870	.188	.008	.045	.083	.117	.093	.071			.011	—				
13	51.85	21.30	1.85	3.32	1.49	6.32	3.80	7.70	0.77		0.81	trace		Cl 0.52	99.64	
A2. II	.864	.209	.012	.046	.037	.113	.061	.082			.010	—				
14	51.71	20.27	1.57	3.26	2.21	6.66	4.91	7.39	0.71		0.83			Cl 0.45	99.97	
A2. II	.862	.199	.010	.046	.055	.120	.079	.079			.010					
15	52.10	15.05	3.40	5.49	4.85	9.13	4.07	5.43			0.88	0.26			100.66	
A2. II	.868	.148	.021	.078	.121	.163	.066	.057			.011	.002				

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 3. SODIOPOTASSIC. BOROLANOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name:	Remarks.
1	II.6.2.3(4).	or 29.47 di 17.98 ab 11.00 wo 1.04 an 11.68 mt 4.87 ne 18.46 il 2.38 ap 1.01	Schoolhouse, Magnet Cove, Arkansas.	H. S. Washing- ton.	H. S. Washington, B. G. S. A., XI, p. 399, 1900.	Shonkinite (covite).	Also in J. G., IX, p. 612, 1901. In W. T., p. 297.
2	II(III).6.2.3.	or 36.14 di 24.97 ab 6.81 ol 6.09 an 8.62 mt 3.94 ne 10.79 il 0.91 ap 0.34	Middle Peak, Highwood Moun- tains, Montana.	E. B. Hurlbut.	L. V. Pirsson, U. S. G. S. B. 237, p. 92, 1905.	Basic syenite.	In W. T., p. 297.
3	II.(5)6.(1)2.3(4).	or 45.59 di 16.09 ab 8.91 ol 1.99 an 6.12 mt 6.03 ne 9.66 il 0.76 th 0.57 ap 1.34	Shonkin Creek, Highwood Moun- tains, Montana.	W. M. Bradley.	L. V. Pirsson, U. S. G. S. B. 237, p. 139, 1905.	Syenite porphyry.	In W. T., p. 295
4	II.(5)6.2.3.	or 43.37 di 10.86 ab 11.53 wo 0.23 an 12.23 mt 6.96 ne 12.21 il 0.15 ap 0.67	Kruger Mountain, Okanagan Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 451, 1912.	Biotite- melanite- nephelite syenite.	
5	II''.(5)6.2.''3.	or 40.59 di 18.36 ab 7.07 wo 1.86 an 8.90 mt 7.42 ne 10.36 il 1.82 hm 0.96 ap 1.01	Kruger Mountain, Okanagan Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 450, 1912.	Malignite.	
6	II.6.2.3.⊙	or 34.47 di 14.47 ab 11.53 ol 1.05 an 11.40 mt 2.09 ne 15.34 il 1.67 hm 1.76 ap 1.34	Rock Creek Chonolith, Mid- way Mountains, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 405, 1912.	Rhomben porphyry.	Center of mass. Cf. No. 32, II.5.2.3.
7	II.6''.''2.3.	or 41.70 di 6.05 ab 1.57 wo 4.06 an 9.17 mt 3.25 ne 24.42 il 1.37 hm 4.48	Lake Borolan, Assynt, Scotland.	J. H. Player.	Horne and Teall, Tr. R. Soc. Edin., XXXVII(1), p. 178, 1893.	Borolanite.	In W. T., p. 297.
8	(I)II.6.2.3.	or 44.48 di 3.78 ab 7.07 wo 4.29 an 10.56 mt 3.48 ne 20.02 il 0.61 th 0.85	Kubatschka Mountain, n. Praskowitz, Bohemia.	A. Pelikan.	A. Pelikan, T. M. P. M., XXV, p. 122, 1906.	Analcite phonolite.	
9	II.(5)6.2(3)''3.	or 56.70 di 19.04 ab 5.76 ol 4.95 an 18.90 mt 3.94 ne 10.51	San Martino, Vico Volcano, n. Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Leucite tephrite.	
10	''II.6.(1)2.3.	or 47.26 di 13.93 ab 3.14 ol 1.97 an 8.62 mt 1.62 ne 21.02 il 0.61 hl 0.59 ap 0.34	Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4), IX, p. 146, 1907.	Microsyenite.	
11	II.6.''2.3.	or 38.92 di 16.62 ab 6.81 ol 2.57 an 9.73 mt 1.62 ne 21.87 il 0.76 hl 0.59	Pollena Ravine, Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4), IX, p. 137, 1907.	Pollenite (trachyte pumice).	
12	II.6''.(1)2.3.	or 39.48 di 19.89 ab 2.88 ol 1.56 an 7.78 mt 1.86 ne 23.71 il 1.67 hl 0.47	Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4), IX, p. 137, 1907.	Pollenite (trachyte).	
13	''II.6.2''''3.	or 45.59 di 11.76 ab 1.57 ol 0.99 an 20.29 mt 2.78 ne 14.48 il 1.52 hl 0.82	Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4), IX, p. 131, 1907.	Leucite tephrite.	
14	II.6.2.3.⊙	or 43.37 di 16.51 an 13.07 ol 0.66 lc 0.44 mt 2.32 ne 20.73 il 0.52 hl 0.70	Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus., (4), IX, p. 153, 1907.	Leucite tephrite.	
15	II(III).6.''2.3.	or 31.69 di 23.42 ab 8.38 ol 2.67 an 6.95 mt 4.87 ne 14.20 il 1.67 ap 0.67	Vulcanello, Vulcano, Aeolian Islands.	Pisani.	A. Lacroix, C. R., CXLVII, p. 1454, 1908.	Leucite tephrite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. ESSEXASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16	55.18	19.02	0.11	3.18	1.08	8.83	4.68	5.61	1.32	0.26	0.46	0.24		SO ₃ 0.05 Cl 0.02	100.04	
A2. II	.920	.186	.001	.044	.027	.157	.076	.060			.006	.002				
17	50.15	15.86	2.44	5.39	5.30	8.40	4.13	5.00	1.50		1.00	0.86			100.03	
A2. II	.836	.156	.015	.075	.13	.150	.066	.053			.012	.006				
18	51.85	19.08	4.25	2.69	1.48	5.81	4.46	6.61	0.55	0.47	0.66	1.23	0.51	ZrO ₂ none Cl 0.21 F 0.10 S 0.01 Cr ₂ O ₃ none BaO 0.17 SrO 0.19	100.40	
A1. I	.884	.187	.027	.038	.037	.104	.072	.070			.008	.009	.007			
19	50.18	17.82	4.04	3.89	2.88	7.19	3.29	6.65	0.96	0.55	0.76	0.76	0.30	ZrO ₂ none Cl 0.16 F 0.02 S 0.02 Cr ₂ O ₃ none BaO 0.25 SrO 0.29	100.01	
A1. I	.836	.175	.025	.054	.072	.129	.053	.071			.010	.005	.004			
20	48.66	17.69	4.66	4.40	3.03	6.43	3.93	6.10	0.80	0.58	0.81	0.79	1.49	ZrO ₂ none Cl 0.24 F 0.16 S 0.05 Cr ₂ O ₃ none BaO 0.16 SrO 0.21	100.19	
A1. I	.811	.173	.029	.061	.076	.114	.063	.065			.010	.006	.021			
21	46.50	16.48	3.80	7.47	3.46	6.14	4.19	4.54	3.57	0.21	2.40	1.13	0.15	CO ₂ 0.28 SO ₃ none Cl trace Cr ₂ O ₃ none V ₂ O ₅ trace NiO none BaO 0.08 SrO trace	100.40	2.765
A1. I	.775	.162	.024	.104	.087	.110	.068	.048			.030	.008	.002			
22	53.64	18.26	4.66	2.72	1.53	3.70	5.51	5.86	3.73			0.12			99.73	
A3. III	.894	.179	.029	.038	.038	.066	.089	.063				.001				
23	52.25	18.70	2.55	3.69	1.78	3.95	5.10	6.62	2.75		2.29	0.20			99.88	
A2. II	.871	.183	.016	.051	.045	.071	.082	.070			.029	.001				

RANG 2. DOMALKALIC. ESSEXASE.

1	50.98	22.15	1.04	4.25	0.79	7.90	6.84	2.71	1.22	0.12	1.38	0.38	trace	CO ₂ trace Cl trace	99.76	2.82
A2. II	.850	.217	.008	.059	.020	.141	.110	.029			.018	.003	—			
2	48.69	17.91	3.09	6.41	3.06	7.30	5.95	2.56	0.95		2.71	1.11	0.15	NiO 0.05 BaO 0.08	100.02	
A2. II	.812	.175	.019	.089	.077	.130	.096	.028			.034	.008	.002			
3	51.58	19.40	4.25	5.25	0.49	3.64	7.49	4.23	1.02		0.35	0.15	0.20	CO ₂ 1.53	99.59	
A2. II	.860	.190	.027	.073	.012	.065	.121	.045			.004	.001	.003			
4	47.94	17.44	6.84	6.51	2.07	7.47	5.63	2.79	2.04		0.20	1.04			99.92	
A2. II	.799	.171	.043	.090	.052	.133	.091	.030			.003	.007				
5	46.99	17.94	2.56	7.56	3.22	7.85	6.35	2.62	0.65		2.92	0.94	trace	BaO none	99.60	2.919
A2. II	.783	.176	.016	.105	.081	.140	.102	.028			.035	.007	—			
6	53.34	17.92	2.27	5.51	1.40	4.19	6.41	4.32	2.08	0.58	1.60	0.44	0.17	ZrO ₂ trace S 0.03 BaO 0.09 SrO 0.06 Ca ₂ O ₃ 0.05 Li ₂ O trace	100.46	2.686
A1. I	.889	.176	.014	.076	.035	.075	.103	.046			.020	.003	.002			

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 3. SODIOPOTASSIC. BOROLANOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	II.(5)6.2.3.	or 33.36 di 15.00 ab 18.86 wo 4.18 an 13.90 mt 0.23 ne 11.36 il 0.91 ap 0.67	Mount Ankitsika, Madagascar.	Not stated.	A. Lacroix, pers. com.	Phonolite breccia.	
17	II(III).6.2.3.	or 29.47 di 20.89 ab 10.74 ol 6.83 an 10.29 mt 3.48 ne 12.92 il 1.82 ap 2.02	Gentungen, Maros, Celebes.	Hinden.	C. Schmidt in Sarasin, Ins. Celebes, IV, p. 24, 1901.	Nephelite shonkinitic.	
18	"II.(5)6.2.3.	or 38.92 di 6.45 ab 18.86 ol 1.39 an 12.51 mt 6.26 ne 10.22 il 1.22 ap 3.02	Gillinan River, n. Masin, Mount Mouriah, Java.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Vicoite (leucite tephrite).	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.
19	II.(5)6.2."3.	or 39.48 di 14.77 ab 7.34 ol 2.25 an 14.18 mt 5.80 ne 11.08 il 1.52 ap 1.68	Gillinan River, n. Masin, Mount Mouriah, Java	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Leucite tephrite.	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.
20	II."6.2.3.	or 36.14 di 11.16 ab 9.43 ol 5.70 an 12.51 mt 6.73 ne 12.78 il 1.52 ap 2.02	Gillinan River, n. Masin, Mount Mouriah, Java	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Leucite tephrite.	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.
21	II'.'(5)6.2.3'.	or 26.69 di 8.44 ab 17.55 ol 8.36 an 12.79 mt 5.57 ne 9.80 il 4.56 ap 2.69	Wallaya, Camden, New South Wales.	H. P. White.	G. W. Card, pers. com.	Mica lampro- phyre.	
22	"II.(5)6.(1)2.3"	or 35.03 di 8.90 ab 26.98 ol 6.33 an 7.51 mt 6.73 ne 10.65 ap 0.34	Porto Bello Penin- sula, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 397, 1906.	Ulrichite (camptoni- tic tingua- ite).	
23	"II.(5)6."2.3.	or 38.92 di 8.12 ab 18.86 ol 1.04 an 8.62 mt 3.71 ne 13.06 il 4.41 ap 0.34	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 97, 1910.	Nephelite syenite.	

SUBRANG 4. DOSODIC. ESSEXOSE. (C. I. P. W., 1902.)

1	"II.6.2(3).4.	or 16.12 di 13.00 ab 24.89 mt 1.39 an 21.68 il 2.74 ne 17.75 ap 1.01	Kakarsuak, n. Narsak, Himausak region, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 208, 1911.	Essexite porphyrite.	
2	II."6.2.4.	or 15.57 di 11.74 ab 28.30 ol 5.11 an 14.18 mt 4.41 ne 11.93 il 5.17 ap 2.69	Mount Johnson, Quebec.	M. F. Connor.	F. D. Adams, J. G., XI, p. 265, 1903.	Olivine essexite.	
3	(I)II."6.(1)2.4.	or 25.02 di 0.71 ab 35.11 ol 5.13 an 6.67 mt 6.26 ne 15.34 il 0.61 ap 0.34	Hotspur, Mon- mouth Township, Ontario.	M. F. Connor.	Adams and Barlow, Can. G. S. Mem. 6., p. 264, 1910.	Nephelite syenite.	3.49 per cent calcite as inclusions.
4	II."6.2.4.	or 16.68 di 13.32 ab 26.20 ol 3.06 an 13.94 mt 9.98 ne 11.64 il 0.46 ap 2.35	Salem Neck, Essex County, Massachusetts.	M. Dittrich.	H. Rosenbusch, Elem. Gest., 1898, p. 172,	Essexite.	TiO ₂ low? In W. T., p. 299.
5	II'."6.2.4.	or 15.57 di 16.24 ab 18.86 ol 5.31 an 12.79 mt 3.71 ne 18.74 il 5.32 ap 2.35	Salem Neck, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VII, p. 57, 1899.	Essexite.	In W. T., p. 299.
6	II.(5)6.(1)2.4.	or 25.58 di 8.88 ab 33.54 ol 3.61 an 7.51 mt 3.25 ne 11.08 il 3.04 ap 1.01	Big Hill Canyon, Rio Grande, Trans Pecos, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 228, p. 75, 1904.	Essexite.	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. ESSEXASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	48.23	17.43	2.77	5.92	2.99	6.38	6.87	2.78	2.84	0.54	2.00	0.69	0.18	ZrO ₂ 0.04 S 0.08 Cr ₂ O ₃ none V ₂ O ₅ 0.04 NiO trace BaO 0.08 SrO 0.08 Li ₂ O trace	99.97	2.742
A1. I	.804	.171	.017	.082	0.75	.114	.111	.030			.025	.005	.003			
8	47.67	18.22	3.65	3.85	6.35	8.03	4.93	3.82	2.97	0.38			0.28		100.15	
A3. III	.795	.179	.023	.053	.159	.143	.080	.041					.004			
9	54.88	18.53	2.93	1.92	1.26	4.15	6.65	4.90	1.75	0.38	0.93	0.27	0.25	CO ₂ 0.13 ZrO ₂ 0.03 SO ₃ 0.36 Cl 0.14 FeS ₂ 0.10 BaO 0.18 SrO 0.11	99.85	
A1. I	.915	.182	.018	.026	.032	.074	.107	.052			.012	.002	.004			
10	54.43	19.01	2.85	1.93	0.99	4.33	6.92	5.07	1.68	0.31	0.96	0.25	0.08	CO ₂ 0.14 ZrO ₂ 0.04 SO ₃ 0.42 Cl 0.22 FeS ₂ 0.07 BaO 0.21 SrO 0.21	100.12	
A1. I	.907	.186	.018	.026	.025	.077	.111	.054			.012	.002	.001			
11	54.34	19.23	3.19	2.11	1.28	4.53	6.38	5.14	1.17	0.14	1.09	0.27	0.08	CO ₂ none ZrO ₂ 0.07 SO ₃ 0.28 Cl 0.28 V ₂ O ₅ 0.02 BaO 0.24 SrO 0.16	99.77	2.68
A1. I	.906	.189	.020	.030	.032	.081	.103	.055			.014	.002	.001			
12	51.42	19.40	3.74	3.33	2.56	7.80	5.28	3.96	0.49	0.04	1.39	0.53	0.23	CO ₂ none ZrO ₂ 0.03 S 0.03 BaO 0.21	100.39	
A1. I	.857	.190	.023	.046	.064	.139	.085	.042			.018	.004	.003			
13	51.19	21.16	2.85	2.31	2.34	6.79	5.43	4.78	0.54	0.08	1.54	0.62	0.25	CO ₂ none ZrO ₂ none S 0.04 BaO 0.11	100.03	
A1. I	.853	.207	.018	.032	.059	.121	.087	.051			.019	.004	.004			
14	54.40	19.62	2.10	2.56	1.01	5.33	7.21	4.88	3.23		0.43	0.21		S 0.18	101.16	2.626
B2. III	.907	.192	.013	.036	.025	.095	.116	.052			.005	.001				
15	44.22	13.78	5.26	7.02	7.51	8.71	4.38	1.77	2.83	0.34	2.70	1.18	0.40	CO ₂ 0.37 Cl 0.03 Cr ₂ O ₃ 0.03 V ₂ O ₅ 0.03 NiO trace BaO 0.10 SrO 0.05 Li ₂ O trace	100.71	
A1. I	.737	.135	.033	.097	.188	.155	.071	.019			.034	.008	.006			
16	53.12	20.48	5.13	1.50	1.88	4.29	6.20	4.88	2.25		0.25	0.43		SO ₃ 0.14 Cl 0.28	100.59	2.674
A2. II	.885	.201	.032	.021	.047	.076	.100	.052			.003	.003				
17	55.11	20.08	2.30	3.87	1.67	5.06	7.88	3.16	0.59						99.72	
A3. III	.919	.197	.014	.054	.042	.090	.127	.034								
18	55.07	19.57	3.38	3.42	1.68	5.56	7.10	3.34	0.38						99.50	
A3. III	.918	.192	.021	.048	.042	.100	.114	.035								
19	48.60	19.89	2.97	5.76	1.32	4.43	8.74	2.26	1.73	0.21	1.34	0.56	0.36	CO ₂ 1.10 SO ₃ 0.10 F 0.06 S 0.01 BaO 0.05 Ce ₂ O ₃ 0.59	100.11	
A1. I	.810	.195	.019	.080	.033	.079	.141	.024			.017	.004	.005			
20	51.91	19.58	6.39	2.30	0.54	5.50	7.70	3.32	0.50		1.56	0.72	trace	Cl trace S trace Cr ₂ O ₃ trace BaO trace SrO trace	100.02	2.713
A3. III	.865	.192	.040	.032	.014	.098	.124	.034			.020	.005	—			

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 4. DOSODIC. ESSEXOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	II.6."2.4.	or 16.68 di 15.13 ab 23.84 ol 4.18 an 8.34 mt 3.94 ne 18.60 il 3.80 ap 1.68	Near Big Mountain, Uvalde County, Texas.	W. F. Hille- brand.	T. W. Vaughan, U. S. G. S. B. 168, p. 61, 1900.	Basanite.	In W. T., p. 299.
8	II."6.2"."4.	or 22.80 di 18.84 ab 6.29 ol 8.17 an 16.12 mt 5.34 ne 19.31	Alabaugh Creek, Crazy Mountains, Montana.	G. Schneider.	J. E. Wolff, U. S. G. S. B. 150, p. 201, 1898.	Theralite.	In W. T., p. 299.
9	(I)II.(5)6.(1)2."4.	or 28.91 di 7.91 ab 35.11 wo 0.23 an 8.06 mt 3.25 ne 9.66 il 1.82 hl 0.47 hm 0.32 th 0.57 ap 0.67	Portland Mine, Cripple Creek, Colorado.	W. F. Hille- brand.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 79, 1906.	Latite phonolite.	
10	(I)II.(5)6.(1)2."4.	or 30.02 di 5.40 ab 33.01 wo 1.86 an 8.06 mt 3.25 ne 11.36 il 1.82 hl 0.47 hm 0.64 th 0.57 ap 0.67	Bull Cliff, Cripple Creek, Colorado.	W. F. Hille- brand.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 87, 1906.	Latite phonolite.	
11	(I)II.(5)6.2.(3)4.	or 30.58 di 6.91 ab 31.44 wo 1.04 an 9.17 mt 3.94 ne 11.08 il 2.13 hl 0.47 hm 0.48 ap 0.67	Longfellow mine, Cripple Creek, Colorado.	W. F. Hille- brand.	W. Cross, U. S. G. S. A. R. 16, (II), p. 45, 1895.	Nephelite syenite.	In W. T., p. 263.
12	II.(5)6.2"."4.	or 23.35 di 13.71 ab 23.68 ol 0.48 an 17.51 mt 5.34 ne 11.36 il 2.74 ap 1.34	Ortiz Mountains, east of Albuquerque, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 235, 1908.	Diorite essexite.	
13	"II.6.2"."(3)4.	or 28.36 di 8.42 ab 18.86 ol 1.68 an 19.18 mt 4.41 ne 14.48 il 1.98 hm 0.80 ap 1.34	Ortiz Mountains, east of Albuquerque, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 235, 1908.	Diorite essexite.	
14	"II.6.(1)2.4.	or 28.91 di 9.87 ab 26.72 wo 2.90 an 6.67 mt 3.02 ne 18.46 il 0.76 ap 0.34	Cuesta de la Camera, Salta, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 618, 1906.	Trachyte tephrite.	
15	II."6.2"."4.	or 10.56 di 18.38 ab 20.44 ol 10.57 an 12.51 mt 7.66 ne 9.09 il 5.17 ap 2.69	Kidlaw, East Lothian, Scotland.	E. G. Radley.	E. B. Bailey, G. S. Scot. Mem. E. Loth., p. 113, 1910.	Analcite basalt.	
16	(I)II.(5)6.2"."4.	or 28.91 di 3.67 ab 29.60 ol 2.10 an 13.62 mt 4.18 ne 12.35 il 0.46 hm 2.24 ap 1.01	Bauza, Columbretes Islands, Spain.	R. Pfohl.	F. Beeke, T. M. P. M., XVI, p. 168, 1896.	Tephritic trachyte	In W. T., p. 263.
17	"II.6."2.4.	or 18.90 di 12.52 ab 35.11 ol 2.38 an 10.01 mt 3.25 ne 17.04	Stoksund, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 116, 1890.	Rhomben porphyry.	Pressed. Border of lens. In W. T., p. 299.
18	II."6.2.4.	or 19.46 di 13.05 ab 36.16 ol 0.83 an 11.95 mt 4.87 ne 12.78	Stoksund, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 116, 1890.	Rhomben porphyry.	Pressed. Inner part of lens. In W. T., p. 299.
19	"II.6.2.4(5).	or 13.34 di 2.60 ab 34.84 ol 6.31 an 8.34 mt 4.41 ne 21.16 il 2.58 ce 2.50 ap 1.34	Byske, Alnunge, Sweden.	M. Dittrich.	P. Quensel, B. G. Inst. Un. Ups., XII, p. 179, 1914.	Canadite (nephelite syenite).	CO ₂ in primary canerinite.
20	II."6."2.4.	or 18.90 di 3.03 ab 37.20 wo 3.83 an 9.45 mt 2.78 ne 15.05 il 3.04 hm 4.48 ap 1.68	Kauling, Rhöngebirge, Germany.	M. Scheidt.	H. Lenk, Vh. Ph. Med. Ges. Wurzb., XXI, p. (36), 1887.	Phonolite.	In W. T., p. 299.

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. ESSEXASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
21	51.40	18.54	2.85	4.69	1.35	7.25	6.72	4.40	0.68	0.12	0.55	0.69	0.46	CO ₂ 0.20 SO ₂ 0.30 Cl	100.20	2.745
A2. II	.857	.182	.018	.065	.034	.130	.108	.047			.007	.005	.007			
22	50.50	17.71	5.41	4.02	3.33	7.91	5.52	3.02	0.45		1.91	0.92			100.70	2.855
A2. II	.842	.174	.034	.056	.083	.141	.089	.032			.024	.006				
23	50.26	20.91	0.19	4.44	1.22	3.84	7.76	4.84	3.99		2.10	0.31			99.86	
A2. II	.838	.205	.001	.061	.030	.068	.125	.051			.026	.002				
24	47.76	18.93	3.34	5.18	4.80	7.45	5.87	3.29	1.01		0.98	0.52	0.50	SO ₂ 0.42 Cl trace	100.05	
A2. II	.796	.186	.021	.072	.120	.133	.095	.035			.012	.004	.007			
25	47.04	18.53	4.04	3.47	2.75	9.02	5.46	4.73	0.87	0.35	1.30	0.68		CO ₂ 0.20 ZrO ₂ 0.16 SO ₃ 1.25 Cl 0.41 S 0.12 BaO 0.22	100.80	
A1. I	.784	.182	.025	.049	.069	.161	.088	.050			.016	.005				
26	49.08	17.38	5.83	6.05	3.70	7.41	5.84	2.16	n. d.		2.12	0.19			99.76	
A2. II	.818	.170	.036	.084	.093	.132	.094	.023			.027	.001				
27	49.15	17.86	1.07	10.77	3.24	6.57	5.49	2.99	1.21		0.83	0.99	0.75	CO ₂ trace Cl trace S trace	100.92	2.790
B2. III	.819	.175	.007	.150	.081	.118	.089	.032			.010	.007	.011		(100.22)	
28	49.90	19.89	2.55	4.78	5.05	7.21	5.60	3.74	0.19	0.13	0.93		trace		99.97	
A3. III	.832	.195	.016	.066	.126	.129	.090	.040			.012		—			
29	48.35	19.94	2.48	5.25	5.15	7.98	5.47	3.99	0.22	0.16	0.12	0.84	trace		99.95	
A2. II	.806	.195	.016	.073	.129	.143	.089	.042			.002	.006	—			
30	52.82	21.13	2.41	2.74	1.09	5.30	7.22	5.34	0.63	0.13	0.86	0.36		SO ₂ 0.39 Cl 0.23	100.65	
A2. II	.880	.207	.015	.038	.027	.095	.116	.056			.011	.003			(100.35)	
31	51.10	21.10	0.90	5.58	2.81	5.35	6.35	4.21	0.87		1.38			Cl trace	99.65	
A3. III	.852	.207	.006	.078	.070	.096	.103	.045			.017					
32	47.34	16.28	5.82	4.89	3.51	9.50	4.89	3.34	0.20	0.12	2.83	1.01		SO ₂ 0.43	100.20	
A2. II	.789	.160	.036	.068	.088	.170	.079	.035			.035	.007				
33a	46.66	18.57	2.14	7.48	2.93	7.93	6.49	2.79	0.70	0.20	3.00	0.40	0.19		99.48	
A2. II	.778	.182	.013	.104	.073	.141	.105	.030			.038	.063	.003			
34	46.60	16.79	3.87	7.58	2.88	7.85	5.18	3.31	3.04		1.76	1.76			100.62	
A2. II	.777	.165	.024	.106	.072	.140	.084	.035			.022	.012				
35	51.31	20.70	3.10	2.50	1.02	3.57	6.50	5.38	3.85						99.85	
A3. IV	.855	.203	.019	.035	.026	.064	.105	.057								

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 4. DOSODIC. ESSEXOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
21	II.6.(1)2.4.	or 26.13 di 19.00 ab 18.34 wo 0.46 an 7.51 mt 4.18 ne 20.73 il 1.06 ap 1.68	Schlossberg, Grosspriessen, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XXI, p. 167, 1902.	Hauyne tephrite.	
22	II.(5)6.2.4.	or 17.79 di 14.69 ab 29.08 ol 1.05 an 14.73 mt 7.42 ne 9.51 il 3.35 hm 0.32 ap 2.02	Rongstock, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XV, p. 487, 1895.	Dolerite (essexite).	Cf. No. 43, II.5.3.3. In W. T., p. 299.
23	"II.6"(1)2.4.	or 28.36 di 7.45 ab 18.86 ol 2.78 an 8.06 mt 0.22 ne 25.28 il 3.95 ap 0.67	Viezzena, Predazzo, Tyrol.	J. A. Ippen.	J. A. Ippen, Sb. Wien. Akad., cxi, I, p. 275, 1902.	Tinguaite porphyry.	
24	II.6.2"/4.	or 19.46 di 13.25 ab 14.67 ol 8.45 an 16.96 mt 4.87 ne 17.61 il 1.82 th 0.71 ap 1.34	Schanhübel, Polzen District, Bohemia.	K. H. Scheu- mann.	K. H. Scheumann, Abh. Sachs. Ges. W., XXXII, p. 758, 1913.	Hauyne trachy- dolerite.	
25	II.6.2''(3)4.	or 27.80 di 16.89 ab 8.38 wo 0.12 an 18.35 mt 5.80 ne 14.20 il 2.43 hl 0.70 ap 1.68 th 2.27	Rio Nocelletto, Monte Vulture, Italy.	H. S. Washing- ton.	Not published.	Hauyno- phyre.	
26	II''/6.2.4.	or 12.79 di 16.87 ab 28.30 ol 2.88 an 14.73 mt 8.35 ne 11.36 il 4.10 ap 0.34	Eruption of Jan. 25, 1911, Mount Etna, collected at Cata- nia, Sicily.	F. S. Starrabbia.	F. S. Starrabbia, At. Ae. Gioen. (5), IV, No. XXII, p. 22, 1911.	Basalt sand.	
27	II.(5)6.2(3)4.	or 13.34 di 7.80 ab 27.77 ol 17.37 an 17.24 mt 1.62 ne 10.22 il 1.52 ap 3.25	Ribeira de Massapez, Madeira.	Not stated.	H. Rosenbusch, Elem. Gest., p. 433, 1910.	Diabase (essexite).	K ₂ O incorrect in Z. D. G. G., LXIV, p. 399, 1912.
28	II.6.2''/4.	or 22.24 di 14.30 ab 13.62 ol 7.74 an 18.07 mt 3.71 ne 18.18 il 1.82	Gediz River, n. Kula, Asia Minor.	H. S. Washing- ton.	H. S. Washington, J. G., VIII, p. 613, 1900.	Leucite kulaite.	In W. T., p. 299.
29	II.6.2''''/4.	or 23.35 di 13.22 ab 9.43 ol 9.01 an 17.79 mt 3.71 ne 20.16 il 0.30 ap 2.02	Kula, Asia Minor.	H. S. Washing- ton.	H. S. Washington, J. G., VIII, p. 613, 1900.	Kulaite (hornblende basalt).	In W. T., p. 299.
30	(I)II.6.2''/4.	or 31.14 di 8.80 ab 20.96 wo 0.35 an 11.95 mt 3.48 ne 19.31 il 1.67 hl 0.35 ap 1.01 th 0.71	Mount Ankitsika, Madagascar.	Not stated.	A. Lacroix, pers. com.	Phonolite.	
31	II.6.2.4.⊙	or 25.02 di 8.53 ab 18.34 ol 7.38 an 16.40 mt 1.39 ne 19.31 il 2.58	Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 32, 1902.	Covite.	
32	II(III)''/6.2''/4.	or 19.46 di 19.01 ab 18.86 wo 0.93 an 14.18 mt 7.66 ne 10.79 il 5.32 th 0.71 hm 0.48 ap 2.35	Kasige, Itasy, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 179, 1913.	Hauyne andesite.	
33	II''/6''/2.4.	or 16.68 di 19.72 ab 13.62 ol 3.76 an 13.07 mt 3.02 re 22.44 il 5.78 ap 1.01	Domain, Auckland, New Zealand.	H. S. Washing- ton.	J. P. Iddings, pers. com.	Nephelite, basanite.	Unpublished.
34	II''/6.2.4.	or 19.46 di 12.46 ab 20.96 ol 6.58 an 12.79 mt 5.57 ne 12.50 il 3.34 ap 4.03	Auckland, New Zealand.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., XLIV, p. 307, 1912.	Nephelinite.	
35	(I)II.6.2.(3)4.	or 31.69 di 4.97 ab 22.53 ol 0.21 an 11.40 mt 2.55 ne 17.61 il 3.65 hm 1.28	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 100, 1910.	Nephelite syenite.	Fresh?

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. ESSEXASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
36	49.52	19.40	2.08	5.15	2.12	6.51	7.15	3.85	0.50		3.30			SO ₃ 0.41 Cl 0.15	100.14	
A2. II	.825	.190	.013	.072	.053	.116	.116	.041			.041					
37	46.10	19.91	2.75	5.02	3.30	6.95	6.10	3.62	2.90		3.02	0.25			99.92	
A2. II	.768	.195	.017	.069	.083	.124	.098	.038			.038	.002			(100.01)	
38	48.70	19.12	2.40	4.77	1.54	6.25	7.83	3.45	2.80		2.37			SO ₃ 0.83 Cl 0.10	190.19	
A2. II	.812	.187	.015	.067	.039	.112	.126	.037			.030					
39	46.25	19.00	4.65	3.60	2.20	6.61	6.10	3.62	4.38		2.78			SO ₃ 0.55 Cl 0.25	99.99	
A2. II	.771	.186	.029	.050	.055	.118	.098	.038			.035					
40	48.64	17.04	3.32	6.14	2.58	5.79	7.16	3.02	3.20		2.06			SO ₃ 0.04 Cl 0.20	99.19	
B2. III	.811	.167	.021	.085	.065	.104	.116	.032			.026				(99.21)	
41	55.93	19.61	1.75	6.32	0.50	3.53	7.75	3.67	0.19	0.10	0.64	0.12	0.13		100.24	
A2. II	.932	.192	.011	.088	.013	.063	.125	.039			.008	.001	.002			
42	45.61	15.70	6.17	7.29	4.84	6.34	5.06	2.67	2.34		3.48		trace	SnO ₂ trace	99.50	2.87
A3. III	.760	.154	.039	.101	.121	.113	.082	.029			.044		—			

RANG 3. ALKALICALIC. SALEMASE. (C. I. P. W., 1902.)

1	47.64	18.67	3.51	5.84	3.92	8.34	2.31	7.10	n. d.		0.77	0.80	0.18	BaO 0.76	99.84	
A2. II	.794	.183	.022	.081	.098	.149	.037	.076			.010	.006	.003			
2	46.08	20.40	2.12	3.27	6.30	8.48	2.07	6.72	1.70	0.06	1.39	1.19	0.19	ZrO ₂ none Cl 0.10 F 0.09 S 0.06 Cr ₂ O ₃ none BaO 0.11 SrO 0.07	100.40	
A1. I	.768	.200	.013	.046	.158	.152	.034	.074			.017	.008	.003			

RANG 3. ALKALICALIC. SALEMASE.

1	45.06	20.95	6.23	2.84	3.31	8.32	3.51	4.09	3.98	0.30	1.25	0.66			100.50	
A2. II	.751	.205	.039	.039	.083	.148	.058	.043			.016	.005				
2	47.73	17.93	4.47	4.58	4.27	9.59	3.62	4.81	0.44	0.24	0.86	0.52	0.96	ZrO ₂ none Cl 0.17 F 0.07 S 0.04 Cr ₂ O ₃ none BaO 0.10 SrO 0.17	100.57	
A1. I	.796	.176	.028	.064	.107	.171	.058	.051			.011	.004	.014			
3	46.60	16.73	4.17	4.78	4.65	10.82	2.62	5.47	0.71	0.45	0.95	1.50	0.41	ZrO ₂ none Cl 0.08 F 0.17 S 0.01 Cr ₂ O ₃ none BaO 0.21 SrO 0.13	100.46	
A1. I	.777	.164	.026	.067	.116	.193	.042	.059			.012	.011	.006			

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 4. DOSODIC. ESSEXOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
35	II.6.2.4.⊙	or 22.80 di 15.92 ab 17.65 wo 0.88 an 11.12 mt 3.02 ne 21.44 il 6.23 hl 0.23 th 0.71	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 115, 1910.	Hauynophyre.	
36	II.6.2.4.⊙	or 21.13 di 12.79 ab 12.05 ol 2.92 an 16.40 mt 3.94 ne 21.30 il 5.78 ap 0.67	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 109, 1910.	Camptonite.	Inclusion in camptonite.
37	II.6''."2.4.	or 20.57 di 13.88 ab 19.91 wo 1.74 an 10.01 mt 3.48 ne 21.58 il 4.56 hl 0.23 th 1.42	Vairao, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 115, 1910.	Hauynophyre.	
38	II.6.2.4.⊙	or 21.13 di 11.88 ab 17.55 wo 0.35 an 16.68 mt 3.48 ne 15.48 il 5.32 hl 0.41 hm 2.24 th 0.99	Vairao, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 115, 1910.	Hauynophyre.	Fresh?
39	II.6.(1)2.4.	or 17.79 di 18.67 ab 23.06 ol 1.73 an 6.12 mt 4.87 ne 19.60 il 3.95 hl 0.35	Arue, Tahiti, Society Islands.	P. Marshall.	P. Marshall, Austr. A. A. S., XIII, p. 197, 1912.	Hauynophyre.	
40	''II.''6.(1)2.4.	or 21.68 di 7.77 ab 39.56 ol 5.05 an 7.78 mt 2.55 ne 14.06 il 1.22 ap 0.34	Scott Island, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 114, 1907.	Trachydolerite.	
41	II(III).6.2.4.	or 16.12 di 15.41 ab 20.96 ol 5.12 an 11.95 mt 9.05 ne 11.93 il 6.69	Franklin Island, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 80, 1899.	Basalt.	In W. T., p. 343.

SUBRANG 2. DOPOTASSIC.

1	II.6.(2)3.2''.	or 31.14 di 13.38 ab 19.46 ol 7.39 lc 8.72 mt 5.10 ne 10.51 il 1.52 ap 2.02	Eruption of April, 1906, Mount Vesuvius, Italy.	R. V. Matteucci.	H. J. Johnston-Lavis, Tr. R. Dubl. Soc., IX, p. 166, 1909.	"Lava" (leucite tephrite).	Three decimals, BaO high?
2	II.6''3.2''.	or 22.80 di 7.26 an 25.58 ol 10.56 lc 14.39 mt 3.02 ne 9.66 il 2.58 ap 2.69	Gentungen, Pic de Maros, Celebes.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 627, 1913.	Fergusite.	Also in Iddings and Morley, J. G., XXIII, p. 242, 1915.

SUBRANG 3. SODIPOTASSIC.

1	II.(5)6.3.3.	or 23.91 di 5.40 ab 11.79 ol 4.06 an 29.47 mt 5.34 ne 9.51 il 2.43 hm 2.56 ap 1.68	Ledmore River, Assynt, Scotland.	A. Gammell.	A. Gammell, Tr. Edin. G. Soc., IX (5), p. 419, 1910.	Ledmorite (melanite syenite).	
2	II(III).6.(2)3.3.	or 28.36 di 20.43 ab 3.93 ol 4.33 an 18.63 mt 6.50 ne 14.34 il 1.67 ap 1.34	Near Ragou, Mount Mouriah, Java.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Vicoite (leucite tephrite).	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.
3	II(III).6.(2)3.''3.	or 32.25 di 20.76 an 17.51 ol 4.51 lc 0.44 mt 6.03 ne 11.93 il 1.82 ap 3.70	Near Ragou, Mount Mouriah, Java.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Leucite tephrite.	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. SALEMASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	51.26	23.78	1.81	2.70	1.96	8.00	6.72	2.16	0.55	0.10	1.65		0.10		100.79	
A2. II	.854	.233	.011	.038	.049	.143	.108	.023			.021		.001			
2	49.96	18.83	2.52	6.64	3.52	7.42	5.26	2.58	0.53	0.07	2.40	0.25	0.20	CO ₂ none Cl trace	100.18	
A2. II	.833	.185	.016	.092	.088	.132	.085	.028			.030	.002	.003			
3	44.50	19.95	4.90	5.45	5.05	10.21	4.65	1.82	1.66		2.63				100.82	
A3. III	.742	.196	.031	.076	.126	.182	.075	.019			.033				(101.32)	
4	43.91	19.63	4.16	5.55	5.20	9.49	4.49	1.51	0.53		3.80	0.32	0.07	CO ₂ 0.51 FeS ₂ 0.64	99.81	
A2. II	.732	.192	.026	.077	.130	.170	.073	.016			.048	.002	.001			
5	45.32	18.99	3.78	9.78	4.68	9.19	3.78	2.12	0.31	0.09	1.94				99.98	2.975
A3. III	.756	.186	.023	.136	.117	.164	.061	.023			.024					
6	50.47	18.73	4.19	4.92	3.48	8.82	4.62	3.56	0.58		0.51	0.10	0.11	CO ₂ trace Cl trace	100.09	
A2. II	.841	.184	.026	.068	.087	.157	.074	.038			.006	.001	.002			
7	43.66	17.35	7.88	5.40	4.27	9.39	5.12	2.07	1.21	1.32					99.66	
A2. II	.728	.170	.049	.075	.107	.167	.083	.022	.015	.009						
8	45.62	18.17	1.28	8.30	6.48	9.43	4.22	1.43	1.54	0.47	2.09	0.71	0.35	CO ₂ none BaO trace SrO trace	100.09	
A2. II	.760	.178	.008	.115	.162	.168	.068	.015			.026	.005	.005			
9	44.50	20.31	2.27	8.84	3.90	11.44	3.70	1.64	1.40		0.31	1.22	0.50	CO ₂ trace	100.03	
A2. II	.742	.199	.014	.123	.098	.204	.060	.017			.004	.008	.007			
10	44.22	16.47	2.94	10.10	4.28	7.89	4.40	2.21	2.77		3.32	1.48		SO ₂ 0.26	100.34	
A2. II	.737	.161	.018	.140	.107	.141	.071	.023			.042	.010				
11	47.58	19.83	4.58	1.61	6.06	7.69	5.50	1.75	3.72	0.20	1.40				99.92	2.89
A3. III	.793	.194	.029	.022	.152	.138	.089	.019			.018					
12	50.18	18.86	0.48	7.80	3.54	10.81	4.92	2.05	n. d.		1.10	0.30	0.03	Cl 0.15 V ₂ O ₅ 0.05	100.27	
A2. II	.836	.185	.003	.108	.088	.193	.079	.022			.014	.002	—			
13	47.51	19.17	2.72	5.69	7.50	9.66	4.20	1.45	1.21		1.10				100.21	2.86
A3. III	.792	.188	.017	.079	.188	.172	.068	.016								
14	49.75	18.30	2.85	6.28	3.45	9.76	4.96	1.89	0.40		2.45	0.03			100.12	
A2. II	.892	.179	.018	.088	.086	.178	.080	.020			.031	—				
15	48.82	18.71	5.50	4.51	3.43	9.67	4.90	1.86	0.23		2.19	0.09			99.91	2.815
A2. II	.814	.183	.034	.063	.086	.173	.079	.020			.027					
16	49.95	22.50	2.20	6.57	3.71	6.80	5.01	2.68	1.12		0.64				101.18	
A ?3. III	.833	.220	.014	.092	.093	.121	.081	.029			.008				(100.18)	

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBRANG 4. DOSODIC. SALEMSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	"II.6.3.4".	or 12.79 di 9.02 ab 27.25 ol 1.11 an 28.36 mt 2.55 ne 15.90 il 3.19	Beloil Mountain, Rouville County, Quebec.	M. F. Connor.	J. J. O'Neill, Can. G. S. Mem. 43, p. 37, 1914.	Rouvillite (theralite).	
2	II.(5)6.(2)3.4.	or 15.57 di 12.06 ab 26.72 ol 6.24 an 20.02 mt 3.71 ne 9.66 il 4.56 ap 0.67	Beloil Mountain, Rouville County, Quebec.	M. F. Connor.	J. J. O'Neill, Can. G. S. Mem. 43, p. 31, 1914.	Essexite.	
3	II".6.3.4.	or 10.56 di 17.50 ab 11.00 ol 4.22 an 28.36 mt 7.19 ne 15.34 il 5.02	Montreal, Quebec.	A. Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 39, 1902.	Spots in nephelite syenite.	
4	II".6.3.4".	or 8.90 di 13.02 ab 16.77 ol 5.24 an 28.63 mt 6.03 ne 11.64 il 6.99 ap 0.67	Mount Yamaska, Quebec.	G. A. Young.	G. A. Young, Can. G. S. A. R. 16, (1904), p. 26H, 1906.	Essexite.	
5	II(III).6.3.4.	or 12.79 di 14.25 ab 12.84 ol 12.06 an 28.36 mt 5.34 ne 10.36 il 3.65	Salem Neck, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VII, p. 63, 1899.	Hornblende gabbro.	In W. T., p. 301.
6	II".6.(2)3".4.	or 21.13 di 18.30 ab 17.32 ol 3.50 an 20.29 mt 6.03 ne 11.36 il 0.91 ap 0.34	Mount Fairview, Rosita Hills, Colorado.	L. G. Eakins.	W. Cross, Pr. Colo. Sci. Soc., II, p. 247, 1887.	Augite diorite.	Also in U. S. G. S. A. R. 17, II, p. 324, 1896. In W. T., p. 301.
7	II(III).6.(2)3.4.	or 12.23 di 15.81 ab 17.29 ol 3.52 an 18.07 mt 11.37 ne 14.20 il 2.28 ap 3.02	Cabo Frio Island, n. Rio de Janeiro, Brazil.	M. Dittrich.	H. Rosenbusch, Elem. Gest., p. 172, 1898.	Essexite.	In W. T., p. 343.
8	II(III).(5)6.3.4".	or 8.34 di 12.71 ab 17.82 ol 15.58 an 28.41 mt 1.86 ne 9.66 il 3.95 ap 1.68	Auchineden Hill, Kilpatrick Hills, Dumbartonshire, Scotland.	A. Scott.	G. W. Tyrrell, Tr. G. Soc. Glas., XIV (III), p. 244, 1912.	Olivine basalt.	
9	II".6.3(4).4.	or 9.45 di 12.81 ab 11.79 ol 13.51 an 33.92 mt 3.25 ne 10.65 il 0.61 ap 2.69	Steinburg, Westerwald, Germany.	Jungeblodt.	A. Dannenberg, T. M. P. M., XVII, p. 480, 1898.	Augite andesite.	In W. T., p. 301.
10	II(III).(5)6.3.4.	or 12.79 di 10.11 ab 22.01 ol 11.96 an 17.79 mt 4.18 ne 8.24 il 6.38 ap 3.36	Neuwerk, Harz.	Not stated.	O. H. Erdmanns- doerfer, N. J. Ch., p. 40, 1909.	Diabase.	Light facies, cf. No. 2, III.6.3.5.
11	II".6.3.4".	or 10.56 di 11.45 ab 22.53 ol 6.93 an 23.91 mt 0.93 ne 13.06 il 2.74 hm 4.00	Ezelstock, Verrucano, Switzerland.	L. Hezner.	R. Beder, In. Diss. Zur., p. 24, 1909.	Olivine- augite porphyrite.	
12	II".6.3.4.	or 12.23 di 23.69 ab 17.82 ol 6.64 an 23.35 mt 0.70 ne 12.78 il 2.13 ap 0.67	Eruption March, 1901, Stromboli, Aeolian Islands.	A. Brun.	A. Brun, Arch. Soc. Phys. Geneve (4), XIII, p. 86, 1902.	Basalt.	Also in Exhal. Volc., p. 94, 1911.
13	II(III).(5)6.3.4.	or 8.90 di 15.14 ab 17.29 ol 12.85 an 28.91 mt 3.94 ne 9.94 il 2.13	Costa di Tramon- tana, Ustica, Aeolian Islands.	A. Martelli.	A. Martelli, Mem. Soc. Ital. Sci., XVII, p. 151, 1912.	Olivine basalt.	
14	II.(5)6.3.4.	or 11.12 di 22.37 ab 23.58 ol 2.08 an 21.96 mt 4.18 ne 9.94 il 4.71	Eruption of 1908, Mount Etna, Sicily.	Pisani.	A. Lacroix, C. R., CXLVII, p. 99, 1908.	Basalt.	
15	II.(5)6.3.4.	or 11.12 di 19.07 ab 25.15 mt 7.80 an 23.35 il 4.10 ne 8.80	Eruption of 1908, Mount Etna, Sicily.	F. S. Starrabba.	F. S. Starrabba, At. Ac. Gioen (5), IV, No. XXII, p. 12, 1911.	Basalt.	
16	II.(5)6.3.4.	or 16.12 di 2.54 ab 23.58 ol 12.72 an 30.58 mt 3.25 ne 10.22 il 1.22	Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 30, 1902.	Microessexite.	

CLASS II. DOSALANE—Continued.

RANG 3. ALKALICALCIC. SALEMASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
17	48.50	21.30	0.95	5.49	4.10	7.42	4.85	3.21	2.12		1.72				99.66	
A3. III	.808	.209	.006	.076	.103	.132	.078	.034			.022					
18	46.40	21.60	4.07	4.95	2.75	8.44	6.29	2.71	1.25		1.57	0.26			100.29	
A2. II	.773	.212	.026	.069	.069	.151	.102	.029			.020	.002			(100.28)	
19	46.71	12.46	3.00	9.03	9.56	11.61	3.10	1.06	1.11		1.74	0.33		Cl trace	99.76	
A2. II	.779	.122	.019	.125	.239	.207	.050	.012			.022	.002				
20	47.50	19.97	3.39	4.74	3.60	6.92	5.25	3.47	2.25		2.96	0.44			100.49	
A2. II	.792	.196	.021	.066	.090	.123	.085	.037			.037	.003				
21	45.10	19.30	1.55	8.70	5.30	9.81	4.32	1.58	0.75		3.49	0.57			100.47	
A2. II	.752	.189	.010	.121	.133	.175	.079	.017			.044	.004				
22	47.40	20.27	5.38	5.48	2.94	7.59	5.78	2.73	0.23		0.63	0.85	0.17		99.45	
A2. II	.790	.199	.034	.076	.074	.136	.094	.029			.008	.006	.002			

RANG 3. ALKALICALCIC. SALEMASE.

1	46.10	18.59	2.63	6.68	3.23	9.86	6.22	0.63	0.80	0.11	3.34	1.41	0.05	CO ₂ none Cl none	99.65	2.895
A2. II	.768	.182	.017	.093	.081	.176	.100	.007			.042	.010	—			
2	47.30	18.27	2.24	6.95	6.78	7.95	5.99	1.00	0.07		1.47	1.61			99.63	2.856
A2. II	.788	.179	.014	.097	.170	.142	.097	.011			.018	.011				

RANG 4. DOCALCIC.

1	45.11	19.67	4.32	8.57	5.65	10.45	3.87	0.64	0.83	0.17	0.21	0.25		FeS ₂ 0.33	100.07	
A2. II	.752	.193	.027	.119	.141	.187	.063	.007			.003	.002				

CLASS II. DOSALANE.

RANG 1. PERALKALIC. LUJAVRASE. (C. I. P. W., 1902.)

1	50.00	20.03	0.98	3.98	0.69	3.41	8.28	8.44	1.50	0.10	0.99	0.21	0.50	CO ₂ 0.22 Cl trace FeS ₂ 0.54 BaO none	99.87	2.701
A2. II	.833	.196	.006	.056	.017	.061	.134	.089			.012	.002	.006			
2	51.93	20.29	3.59	1.20	0.22	1.65	8.49	9.81	0.99	0.10	0.20	0.06	trace	CO ₂ 0.25 SO ₃ 0.67 Cl 0.70 F 0.27 BaO 0.09 SrO 0.07	100.58	
A1. I	.866	.199	.023	.017	.006	.030	.137	.104			.003	—	—			
3	53.10	19.07	5.57	none	0.17	1.33	9.41	6.84	3.98					CO ₂ 0.10	99.57	
A3. III	.885	.187	.035	—	.004	.024	.152	.072								

ORDER 6. LENDOFELIC. NORGARE—Continued.

SUBBRANG 4. DOSODIC. SALEMOSÉ—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
17	II."6.3.4.	or 18.90 di 7.88 ab 16.50 ol 9.34 an 26.97 mt 1.39 ne 13.20 il 3.34	Jangoa, Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 131, 1902.	Essexite.	
18	II.6.(2)3.4.	or 16.12 di 14.12 ab 12.05 ol 2.25 an 22.52 mt 6.03 ne 22.44 il 3.04 ap 0.67	Berondra, Bezavona Mountains, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 194, 1903.	Nephelite monzonite.	
19	II.(5)6.3.4.	or 6.67 di 31.39 ab 15.20 ol 14.35 an 16.63 il 3.34 ne 5.96 ap 0.67	Adolph Friedrich Cone, Lake Kivu District, German East Africa.	O. Hauser.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 22, 1912.	Limbургite.	
20	"II.6.(2)3.4.	or 20.57 di 8.52 ab 18.86 ol 4.29 an 20.57 mt 4.87 ne 13.92 il 5.62 ap 1.01	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 102, 1910.	Nephelite monzonite.	
21	II"."6.3.4.	or 9.45 di 11.09 ab 17.29 ol 12.20 an 28.63 mt 2.32 ne 11.08 il 6.69 ap 1.34	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 103, 1910.	Nephelite gabbro.	
22	II.6.(2)3.4.	or 16.12 di 9.06 ab 20.96 ol 5.63 an 20.29 mt 7.89 ne 15.34 il 1.22 ap 2.02	Mount Terror, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior. R. S. Cross, Exp., p. 326, 1902.	Basalt.	

SUBBRANG 5. PERSODIC. NARSAKOSE. (H. S. WASHINGTON, 1917.)

1	II"."6."3."5.	or 3.89 di 13.61 ab 30.39 ol 4.60 an 20.85 mt 3.94 ne 11.93 il 6.38 ap 3.36	Panernak Bay, Narsak, Ilimausak Region, Green- land.	C. Winther.	N. V. Ussing, G. Julbb., p. 203, 1911.	Essexite	
2	II"."6.(2)3.(4)5.	or 6.12 di 7.63 ab 28.56 ol 15.86 an 19.74 mt 3.25 ne 12.07 il 2.74 ap 3.70	Pedregal, n. Tlalpam, Mexico.	P. Kraus.	Felix and Lenk, Btr. G. Mex., I, p. 103, 1890.	Basalt.	In W. T., p. 303.

SUBBRANG 4-5. PRESODIC.

1	II(III)."6.(3)4. (4)5.	or 3.89 di 13.11 ab 14.15 ol 14.87 an 34.19 mt 6.26 ne 10.22 il 0.46 ap 0.67 pr 0.33	Ober Hambach, Hesse.	R. Marzahn.	Chelius and Klemm, Erl. G. Kt. Hes., Bl. Zweingenberg, p. 37, 1896.	Diorite.	In W. T., p. 303.
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ORDER 7. LENFELIC. ITALARE. (C. I. P. W., 1902.)

SUBBRANG 3. SODIPOTASSIC. JANEIROSE. (C. I. P. W., 1902.)

1	II.7(8).1.3.	or 28.91 ac 2.77 lc 16.13 ns 2.56 ne 30.39 di 12.94 ol 1.23 il 1.82 ap 0.67 pr 0.54	Beemerville, Sussex County, New Jersey.	J. E. Wolff.	J. E. Wolff, B. Mus. Comp. Zool., XXXVIII, p. 276, 1902.	Leucite tinguaite.	
2	"II.7(8).1.3.	or 31.97 ac 10.63 lc 20.28 ns 0.12 ne 26.98 di 4.77 hl 1.17 wo 1.16 th 1.14 il 0.46	Beaver Creek, Bearpaw Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., II., p. 196, 1896.	Leucite tinguaite.	In W. T., p. 303.
3	II.(6)7.1.3(4).	or 40.03 ac 16.17 ab 6.81 ns 0.24 ne 28.97 di 0.86 wo 2.32	Km. 37, Sta. Cruz R. R., Rio de Janeiro, Brazil.	P. Jannasch.	H. Rosenbusch, Elem. Gest., p. 215, 1898.	Tinguaite.	In W. T., p. 303.

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. LUJAVRASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	51.62	15.63	6.06	4.98	trace	3.13	10.09	4.19	2.12		0.44	none	0.33	ZrO ₂ 1.70 Cl 0.17	100.46	
A2. II	.860	.153	.038	.069	—	.055	.163	.045			.006	—	.005			
2	49.46	23.53	3.04	1.02	trace	0.80	14.71	4.34	1.38		0.16	none	0.17	ZrO ₂ 0.38 SO ₃ none Cl 2.25	101.24 .51	2.53
A2. II	.822	.230	.019	.014	—	.014	.237	.046			.002	—	.002		100.73	
3	49.38	17.31	4.20	5.25	0.53	2.23	13.87	2.55	1.30	0.16	0.63	none	0.08	ZrO ₂ 0.61 SO ₃ none Cl 1.68	99.78 .38	2.653
A2. II	.823	.170	.026	.073	.013	.039	.224	.028			.008	—	.001		99.40	
4	54.74	21.53	4.06	0.94	0.18	0.90	12.84	4.18	0.35	trace	trace	trace	0.14		99.86	
A3. III	.912	.211	.025	.013	.005	.016	.207	.044			—	—	.002			
5	50.40	21.83	2.51	1.41	0.39	3.17	9.96	6.10	2.35	0.15	0.50	0.10	0.27	CO ₂ none SO ₃ 0.62 Cl 0.10 S trace BaO 0.33 SrO 0.07	100.26	
A1. I	.840	.214	.016	.019	.010	.057	.161	.065			.006	.001	.004			
6	44.00	23.31	2.37	7.43	0.25	4.86	10.65	3.09	1.24	0.21	0.75	0.33	0.22	CO ₂ 0.98 Cl 0.08 FeS ₂ 0.28 BaO trace SrO 0.01	100.06	
A1. I	.733	.228	.015	.103	.006	.087	.172	.033			.009	.002	.003			
7	48.13	18.44	3.41	4.30	3.06	5.89	8.00	3.80	1.59	0.18	1.74	0.49	0.19	ZrO ₂ 0.05 Cl 0.29 F 0.06 S 0.09 Cr ₂ O ₃ none NiO 0.02 BaO 0.10 SrO 0.10 Li ₂ O trace	99.93	2.770
A1. I	.802	.180	.021	.060	.077	.105	.129	.040			.022	.003	.003			
8	51.94	16.66	3.68	2.68	3.81	4.81	7.53	5.63	0.58		3.30		0.20		100.82	2.579
A2. II	.866	.163	.023	.037	.095	.086	.120	.060			.040		.003			
9	54.14	20.61	3.28	2.08	0.83	1.85	9.87	5.25	0.40		0.95		0.25	ZrO ₂ 0.07 Cl 0.12	100.55	
A2. II	.902	.202	.021	.029	.021	.033	.160	.056			.012		.004			
10	52.25	22.24	2.42	1.98	0.96	1.54	9.78	6.13	0.73		0.60		0.53		99.16	
B2. III	.871	.218	.015	.028	.024	.027	.158	.065			.008		.008			
11	45.22	19.09	5.77	2.20	2.50	2.62	10.33	3.91	5.06		2.10	1.03	0.41	SO ₃ 0.45 Cl trace F 0.09	100.78	2.623
A2. II	.754	.187	.036	.030	.063	.046	.166	.041			.026	.007	.006			
12	48.86	22.24	4.07	3.32	1.09	3.69	8.92	4.43	2.05						99.53	
A3. III	.814	.218	.026	.046	.027	.066	.144	.047								
13	48.35	23.10	2.48	1.80	0.89	2.51	13.20	3.58	2.91		0.45			Cl 1.49	100.85 .31	
A2. II	.806	.226	.016	.025	.022	.045	.213	.038			.006				100.54	
14	50.16	19.75	4.28	3.62	1.12	3.10	7.63	6.73	3.96			0.13			100.48	
A3. III	.836	.194	.027	.050	.028	.055	.123	.071				.001				

ORDER 7. LENFELIC. ITALARE—Continued.

SUBRANG 4. DOSODIC. LUJAVROSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	II(III)''7.1.4.	or 25.02 ac 17.56 ab 9.69 ns 2.07 ne 25.42 di 13.64 Z 2.56 ol 1.43 il 0.76	Kringlerne, Kangerdluarsuk, Himausak Region, Greenland.	N. V. Ussing.	N. V. Ussing, G. Julhb., p. 182, 1911.	Kakortokite (eudialyte lujavrite).	White. In W. T., p. 303.
2	(I)II.7(8).1.4''.	or 25.58 ac 9.24 ab 8.91 di 3.48 ne 47.43 il 0.30 hl 3.74 Z 0.55	Kangerdluarsuk, Himausak Region, Greenland.	N. V. Ussing.	N. V. Ussing, G. Julhb., p. 154, 1911.	Naujaite (sodalite- nephelite syenite).	In W. T., p. 303.
3	II.7.1.4(5).	or 15.57 ac 0.92 ab 28.30 di 9.38 ne 32.94 ol 1.50 hl 2.81 mt 5.57 Z 0.91 il 1.22	Tupersuatsiak, Himausak Region, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 141, 1911.	Sodalite foyaite.	
4	''II.7.1.4.	or 24.46 ac 11.55 ab 21.48 ns 1.83 ne 35.78 di 3.84 ol 0.37	Beloeil Mountain, Rouville County, Quebec.	M. F. Connor.	J. J. O'Neill, Can. G. S. Mem. 43, p. 40, 1914.	Nephelite syenite.	
5	II.7.1.4⊙	or 36.14 ac 7.39 ab 1.31 ns 0.49 ne 39.33 di 7.87 th 1.14 wo 2.78 il 0.91 ap 0.94	Montreal, Quebec.	M. F. Connor.	F. D. Adams, Cong. G. Int. XII, Guide 3, p. 46, 1913.	Tinguaite.	
6	II.7''.1(2).4''.	or 18.35 di 8.62 ab 6.29 ol 5.28 an 6.39 mt 3.48 ne 45.44 il 1.37 ap 0.67 pr 0.28	Glamorgan, Ontario.	M. F. Connor.	Adams and Barlow, Cong. G. Int. XII, Guide 2, p. 96, 1913.	Theralite.	Calcite not cal- culated in norm.
7	II.(6)7.1''4.	or 22.24 di 17.86 ab 14.67 ol 1.56 an 4.17 mt 4.87 ne 27.55 il 3.34 hl 0.47 ap 1.01	Mount Inge, Uvalde County, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 61, 1900.	Basanite.	In W. T., p. 303.
8	II''.(6)7.1.(3)4.	or 33.36 ac 7.85 ab 7.34 di 18.36 ne 25.28 ol 0.70 il 0.08 hm 1.39 pl 0.14	Picota, Serra do Monchique, Portugal.	Zilliacus.	K. Koschlan and Hackmann, T. M. P. M., XVI, p. 272, 1896.	Camptonitic tinguaite.	In W. T., p. 303.
9	''II.(6)7.1.4.	or 31.14 ac 6.47 ab 18.86 di 7.55 ne 31.24 ol 0.17 Z 1.28 mt 1.62 il 1.82	Tschasnatschorr, Umptek, Kola, Finland.	F. Eichleiter.	F. Eichleiter, Verh. Wien G. R. A., XXVII, p. 218, 1893.	Nephelite syenite.	In W. T., p. 305.
10	(I)II.7.1.4.	or 36.14 ac 2.31 ab 12.58 di 6.09 ne 36.64 ol 0.55 mt 2.32 il 1.22	Rabots Spitze, Umptek, Kola, Finland.	V. Hackmann.	V. Hackmann, Fennia, XI, No. 2, p. 132, 1894.	Lujavrite.	In W. T., p. 305.
11	II.7.1.4.⊙	or 22.80 ac 9.24 ab 9.17 di 4.97 ne 36.49 ol 2.80 mt 2.32 il 3.95 ap 0.67	Michelsberg, Katzenbuckel, Odenwald, Germany.	O. N. Heiden- reich.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 304, 1907.	Nephelite- mica porphyry.	Fresh?
12	''II.7.1(2).4.	or 26.13 di 9.03 ab 14.67 di 0.62 an 7.51 mt 6.93 ne 33.23	Allochet, Lake Le Selle, Monzoni, Tyrol.	J. A. Ippen.	J. A. Ippen, Vh. G. R.-A., Wien, 1903, p. 137.	Allochetite (nephelite porphyry).	
13	(I)II.7''.1.4''.	or 21.13 ac 1.85 ab 14.67 di 6.48 ne 45.44 wo 1.86 hl 2.46 mt 2.78 il 0.91	Leeuwfontein, n. Pretoria, Transvaal.	F. Pisani.	H. A. Brouwer, C. R., CXLVIII, p. 1276, 1909.	Sodalite- aegirite foyaite.	Also in Transv. Nephay., p. 42, 1910.
14	II.(6)7.1.(3)4.	or 39.48 di 11.76 ab 8.12 mt 6.26 ne 30.53 ap 0.34	Hoopers Inlet, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 396, 1906.	Tinguaite.	

CLASS II. DOSALANE—Continued.

RANG 1. PERALKALIC. LUJAVRASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	45.60	18.93	5.29	4.71	3.63	7.43	9.65	0.84	0.70	0.43	2.36	0.64			100.21	
A2. II	.760	.186	.033	.065	.091	.132	.156	.009			.030	.005				

RANG 2. DOMALKALIC. VULTURASE. (C. I. P. W., 1902.)

1	47.89	17.87	4.93	3.64	3.68	8.70	2.60	8.23	0.65		0.77	0.36		CO ₂ none ZrO ₂ 0.02 SO ₃ 0.06 BaO 0.28	99.68	2.781
A2. II	.798	.175	.031	.050	.092	.155	.042	.087			.010	.003				
2	47.20	17.66	3.51	4.50	4.20	9.52	2.25	7.63	0.72	0.57	1.19	0.58		CO ₂ none ZrO ₂ 0.04 S none BaO 0.19	99.76	
A2. II	.787	.173	.022	.063	.105	.170	.036	.081			.015	.004				
3	51.65	21.60	0.85	3.12	1.07	4.29	4.30	11.60	0.25		0.65	trace		SO ₃ trace Cl 0.70	100.08	
A3. III	.861	.212	.005	.043	.027	.077	.069	.123			.008	—			(100.20)	
4	48.99	19.82	5.26	2.59	2.82	8.13	3.17	9.06				0.33			100.17	
A3. III	.817	.194	.033	.036	.071	.145	.051	.096				.002				
5	48.28	18.39	1.12	7.88	3.72	9.20	2.84	7.25	0.62		1.28	0.51			101.09	
B2. III	.805	.180	.007	.110	.093	.164	.046	.078			.016	.004				
6	48.10	17.56	2.48	6.10	4.27	8.16	2.67	7.90	0.12	0.04	1.41	1.01		CO ₂ none ZrO ₂ trace S trace BaO 0.08 CuO none	99.90	
A2. II	.802	.172	.016	.085	.107	.146	.044	.084			.018	.007				
7	47.71	17.61	2.46	5.68	4.80	9.42	2.75	7.64	trace		0.37	0.77		CO ₂ none ZrO ₂ 0.06 SO ₃ none S none BaO 0.26	99.53	
A2. II	.795	.173	.015	.079	.120	.168	.045	.081			.005	.005				
8	47.65	18.13	2.63	6.48	4.19	9.01	2.78	7.47	0.13	0.11	1.13	0.50		CO ₂ none ZrO ₂ 0.02 SO ₃ trace BaO 0.24	100.47	
A2. II	.794	.178	.017	.090	.105	.161	.045	.080			.014	.004				
9	47.50	18.59	1.52	7.62	3.86	9.16	2.72	7.05	1.25		1.05	trace			100.32	
A3. III	.792	.182	.009	.106	.096	.164	.044	.075			.013	—				

RANG 2. DOMALKALIC. VULTURASE.

1	48.19	18.52	4.51	1.68	1.12	10.29	3.44	8.05	3.00	0.45	1.75				101.00	2.77
B3. IV	.803	.181	.028	.024	.028	.184	.055	.086			.022					
2	51.10	20.30	1.67	3.31	1.82	7.12	5.20	7.84	0.37		0.84			Cl 0.58	100.15	
A3. III	.852	.199	.010	.046	.046	.127	.084	.083			.010					
3	47.94	19.52	3.99	2.01	3.05	10.40	3.07	7.66	0.20		trace	1.42	0.49	SO ₃ 0.05 Cl trace	99.80	
A3. III	.799	.191	.025	.028	.076	.186	.050	.082			—	.010	.007			
4	47.76	17.29	2.89	3.55	4.22	8.06	4.70	6.77	0.97	0.76	0.75	0.78	0.41	CO ₂ 0.11 ZrO ₂ 0.01 Cl 0.25 F 0.09 S 0.03 Cr ₂ O ₃ 0.03 BaO 0.12 SrO 0.12	99.67	
A1. I	.796	.170	.018	.050	.106	1.44	.076	.072			.009	.006	.006			

ORDER 7. LENFELIC. ITALARE—Continued.

SUBRANG 3. PERSODIC. ANTANGAINOSE. (A. LACROIX.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	II(III).7.1(2).5.	or 5.00 di 20.15 an 12.79 ol 0.12 ab 20.96 wo 0.12 an 5.84 mt 7.66 ne 37.94 il 4.56 ap 1.68	Betankolanton, Madagascar.	Boiteau.	A. Lacroix, pers. com.	Camptonite- monchiquite.	

SUBRANG 2. DOPOTASSIC. BRACCIANOSE. (C. I. P. W., 1902.)

1	II''.7.2.2''.	or 20.85 di 21.67 an 12.79 ol 0.14 lc 21.58 mt 7.19 ne 11.93 il 1.52 ap 0.92	Crocicchie, n. Lake Bracciano, Italy.	H. S. Wash- ington.	H. S. Washington, J. G., V, p. 49, 1897.	Leucitite.	Complete in R. C. R., p. 109, 1906. In W. T., p. 305.
2	II''.7.2''.2.	or 17.24 di 22.46 an 15.57 ol 2.29 lc 21.80 mt 5.10 ne 10.22 il 2.28 ap 1.34	Arcioni, Rocca di Papa, Alban Hills, Italy.	H. S. Wash- ington.	H. S. Washington, R. C. R., p. 113, 1906.	Leucitite.	
3	(I)II.7(8).(1)2. 2(3).	or 25.58 di 10.92 an 8.34 ol 0.89 lc 33.57 mt 1.16 ne 16.78 il 1.22 hl 1.17	Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus., (4), IX, p. 143, 1907.	Leucite sanidinite.	
4	II.7.2.2(3).	or 20.02 di 16.08 an 14.18 wo 1.97 lc 26.16 mt 7.66 ne 13.35 ap 0.67	Lava of 1893, Mount Vesuvius, Italy.	Mrha.	F. Becke, T. M. P. M., XVIII, p. 94, 1898.	Leucite basanite.	In W. T., p. 305.
5	II''.7.2.2(3).	or 15.57 di 21.26 an 15.57 ol 7.26 lc 21.80 mt 1.62 ne 13.06 il 2.43 ap 1.34	Lava of 1906, Mount Vesuvius, Italy.	Pisani.	A. Lacroix, C. R., CXLIII, p. 14, 1906.	Leucite tephrite.	Also in Nouv. Arch. Mus., (4), IX, p. 21, 1907.
6	II''.7.2.2''.	or 25.86 di 17.89 an 12.23 ol 6.26 lc 16.35 mt 3.71 ne 12.50 il 2.74 ap 2.31	Lava of 1903, Valle del Inferno, Mount Vesuvius, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 116, 1906.	Leucite- tephrite.	
7	II(III).(6)7.2.2(3).	or 11.20 di 23.55 an 13.07 ol 6.05 lc 26.60 mt 3.48 ne 12.78 il 0.76 ap 1.77	Lava of 1631, La Scala, Torre del Greco, Mount Vesuvius, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 118, 1906.	Leucite tephrite.	In W. T., p. 307.
8	II(III).7.2.2(3).	or 14.46 di 21.80 an 14.73 ol 5.59 lc 23.54 mt 3.94 ne 12.78 il 2.13 ap 1.30	Lava of 1872, near observatory, Mount Vesuvius, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 105, 1906.	Leucite tephrite.	In W. T., p. 307.
9	II(III).7''.2(3).	or 10.01 di 23.32 an 17.61 ol 6.69 lc 24.85 mt 2.09 ne 12.50 il 1.98	Scoria of 1906, Mount Vesuvius, Italy.	Pisani.	A. Lacroix, C. R., CXLIII, p. 14, 1906.	Leucite tephrite.	Also in Nouv. Arch. Mus., (4), IX, p. 21, 1907.

SUBRANG 3. SODIPOTASSIC. BAWEANOSE. (J. P. IDDIGS.)

1	II.7.2.(2)3.	or 26.97 di 6.05 an 11.12 wo 13.46 lc 16.35 mt 0.46 ne 15.62 il 3.34 hm 4.16	Am. Meallam, Ross shire, Scotland.	W. C. Smith.	W. C. Smith, G. Mag., (V), VI (4), p. 154, 1909.	Borolanite.	
2	II.(6)7.2.3.	or 34.75 di 16.38 an 11.12 wo 1.74 lc 8.94 mt 2.32 ne 21.58 il 1.52 hl 0.94	Monte Somma, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4), IX, p. 131, 1907.	Leucite tephrite.	
3	II.7.2.(2)3.	or 20.29 di 18.70 an 16.40 wo 0.93 lc 19.84 mt 5.90 ne 14.20 ap 3.36	Lava of 1906, Mount Vesuvius, Italy.	L. Szathmary.	L. Szathmary, F. K., XXXVII, p. 181, 1907.	Leucite tephrite.	
4	II''.7.(1)2.3.	or 23.38 di 22.70 an 6.12 ol 2.57 lc 13.08 mt 4.18 ne 21.58 il 1.37 ap 2.02	Tandjung, Anger, Bawean Island.	E. W. Morley.	J. P. Iddings, pers. com.	Vicoite (leucite tephrite).	

CLASS II. DOSALANE—Continued.

RANG 2. DOMALKALIC. VULTURASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	42.72	25.08	2.00	4.36	0.97	6.92	11.02	2.69	0.88		0.38	0.19	0.16	CO ₂ 2.99	100.36	
A2. II	.712	.246	.013	.061	.024	.123	.177	.029			.005	.011	.002			
2	43.68	20.15	2.94	8.97	4.38	7.24	7.00	1.99	0.89		1.10	1.38	0.23	Cl 0.07 F 0.29	100.22	
A2. II	.728	.198	.018	.125	.110	.129	.113	.021			.014	.010	.003			
3	46.34	18.37	2.81	7.24	4.22	8.63	5.94	3.13	2.32		0.78				99.78	
A3. III	.772	.180	.018	.100	.106	.154	.096	.033			.010					
4	44.82	18.11	7.34	3.63	2.92	10.61	5.65	4.30	0.78		0.82	0.78	0.24	SO ₃ 0.07 Cl 0.03 CuO 0.08	99.51	
A2. II	.747	.177	.046	.050	.073	.189	.091	.046			.010	.006	.003			
5	48.45	22.60	1.90	3.37	1.68	7.23	8.60	3.87	2.25		0.90				100.85	
A3. III	.808	.221	.012	.047	.042	.129	.139	.041			.011					

CLASS II. DOSALANE.

RANG 1. PERALKALIC. NAUJAASE. (H. S. WASHINGTON, 1917.)

1	53.10	20.70	0.07	4.77	1.77	3.18	9.10	5.84	0.70		0.47				99.70	
A3. III	.885	.203	.001	.067	.044	.057	.147	.062			.006					

RANG 1. PERALKALIC. NAUJAASE.

1	43.39	23.13	3.62	3.24	none	0.56	19.68	1.51	1.36	0.21	0.20	none	trace	ZrO ₂ 0.27 SO ₃ none Cl 3.63	100.80 .82	2.545
A2. II	.723	.227	.023	.045	—	.010	.318	.016			.003	—	—		99.98	
2	47.43	23.60	4.59	1.20	0.67	4.42	15.08	2.00	n. d.		0.10				99.09	
B3. IV	.791	.231	.029	.017	.017	.078	.243	.021			.001					

RANG 2. DOMALKALIC. VESUVASE. (C. I. P. W., 1902.)

1	47.05	17.08	3.04	4.89	5.67	10.63	1.61	7.52	0.71	0.22	1.15	0.17		CO ₂ none ZrO ₂ 0.02 S none NiO 0.05 BaO 0.09 CuO none	99.90	
A1. I	.784	.167	.019	.068	.142	.189	.026	.080			.014	.001				
2	48.20	18.12	3.29	4.30	4.64	8.40	2.51	8.99	n. d.		1.59	0.38			100.42	
A2. II	.803	.177	.021	.060	.116	.150	.040	.096			.020	.003				

RANG 2. DOMALKALIC. VESUVASE.

1	41.66	22.75	2.33	6.08	3.11	7.76	8.81	3.12	1.50	0.03	1.95	0.10	0.14	CO ₂ 0.40 SO ₃ 0.05 Cl 0.02 S 0.08	99.88	2.892
A2. II	.694	.223	.014	.085	.078	.139	.142	.033			.024	.001	.002			
2	39.55	18.61	5.00	2.94	3.04	10.86	7.11	5.59	0.61	0.41	1.28	0.78	trace	CO ₂ 1.22 ZrO ₂ 0.06 SO ₃ 2.39 Cl 0.54 S 0.05 Cr ₂ O ₃ none BaO 0.23 SrO trace	100.28	
A1. I	.659	.182	.031	.041	.076	.194	.115	.060			.016	.006	—			

ORDER 7. LENFELIC. ITALARE—Continued.

SUBRANG 4. DOSODIC. VULTUROSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	(I,II.7'')2.4(5)	or 16.12 di 2.85 ab 6.55 ol 5.38 an 11.12 mt 3.02 ne 46.72 il 0.76 ap 0.34	Monmouth Township, Renfrew County, Ontario.	N. N. Evans.	Adams and Barlow, Tr. R. Soc. Can., II (4), p. 39, 1909.	Pyroxene-nephelite syenite.	Also in Can. G. S. Mem. 6, p. 272, 1910.
2	II(III).(6)7.2''4'	or 11.68 di 7.39 ab 12.58 ol 14.77 an 17.79 mt 4.18 ne 25.28 il 2.13 ap 3.36	Skallerbol, Almunge, Sweden.	N. Sahlbom.	P. Quensel, B. G. Inst. Ups., XII, (1913), p. 182, 1914.	Theralitic canadite (theralite).	
3	II(III).(6)7.2.4.	or 18.35 di 23.59 ab 4.72 ol 6.21 an 14.18 mt 4.18 ne 24.71 il 1.52	Tatika, Lake Balaton, Hungary.	L. Tomasowsky.	J. Vitalis, F. K., XXXIV., p. 451, 1904.	Nephelite basanite.	
4	II(III).(6)7.2''4.	or 25.58 di 15.77 ab 1.05 wo 6.50 an 11.12 mt 9.98 ne 25.28 il 1.52 hm 0.48 ap 2.02	Ngoma Crater, Lake Kivu District, German East Africa.	O. Hauser.	L. Finckh, D. Zent. Afr. Exp., I, (1) p. 26, 1912.	Melilite nephelinite.	
5	II.7''2.4.	or 22.80 di 15.03 ab 6.29 wo 2.55 an 11.40 mt 2.78 ne 36.07 il 1.67	Andevenanaomby River, Bezavona Mountains, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 194, 1903.	Nephelite syenite.	

ORDER 8. FELDOLENIC. CAMPANARE. (C. I. P. W., 1902.)

SUBRANG 4. DOSODIC.

1	II.''8.1.4.	or 34.47 ns 0.73 ab 11.53 di 13.87 ne 33.80 ol 4.26 il 0.91	Eruption of 1906, Mount Vesuvius, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4) IX, p. 43, 1907.	Obsidian.	Inclusion in No. 2, II.8.2.2.
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SUBRANG 5. PERSODIC. NAUJAOSE. (H. S. WASHINGTON, 1917.)

1	II.8.1.''5.	or 8.90 ac 10.63 ab 5.50 ns 4.03 ne 56.94 di 2.48 hl 5.97 ol 3.26 Z 0.37 il 0.46	Nunasarnak, Ilimausak Region, Greenland.	C. Winther.	N. V. Ussing, G. Julbb., p. 154, 1911.	Naujaite (sodalite-nephelite syenite).	
2	II.8''1.''5.	or 11.68 ac 13.40 ab 1.57 ns 0.49 ne 58.79 di 7.88 wo 5.10 il 0.15	Penikkavaara, Kuuosamo, Finland.	M. Dittrich.	V. Hackmann, B. Com. G. Finl., No. 11, p. 22, 1900.	Sussexite.	Low sum due to H ₂ O? In W. T., p. 305.

SUBRANG 2. DOPOTASSIC. VESUVOSE. (C. I. P. W., 1902.)

1	II(III)''8.2(3).2.	or 3.89 di 27.80 an 16.96 ol 3.96 lc 31.83 mt 4.41 ne 7.68 il 2.13 ap 0.34	Pofi, n. Rome, Italy.	H. S. Washington.	H. S. Washington, R. C. R., p. 135, 1906.	Leucitite.	
2	II''''8.2.2.	or 11.40 di 21.83 an 11.40 ol 2.68 lc 32.82 mt 4.87 ne 11.36 il 3.04 ap 1.01	Eruption of 1906, Mount Vesuvius, Italy.	Pisani.	A. Lacroix, Nouv. Arch. Mus. (4) IX, p. 43, 1907.	Leucite tephrite.	

SUBRANG 4. DOSODIC. MELFOSE. (H. S. WASHINGTON, 1917.)

1	II.8.2.4.⊙	an 13.34 di 17.13 lc 14.39 ol 4.28 ne 40.33 cs 1.20 mt 3.25 il 3.65 ap 0.34	Leachoie, Ice River, British Columbia.	M. F. Connor.	J. A. Allan, pers. com.	Ijolite.	
2	II''8.2.''4.	an 12.51 di 15.55 lc 26.16 ol 0.14 ne 21.87 cs 4.82 hl 0.94 mt 5.80 th 4.26 il 2.43 hm 0.96 ap 2.02	Melfi, Monte Vulture, Apulia, Italy.	H. S. Washington.	H. S. Washington, unpublished.	Hauynophyre.	

CLASS II. DOSALANE.

RANG 1. PERALKALIC. ÜRTASE. (C. I. P. W., 1902.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	44.40	19.95	5.15	2.77	1.75	8.49	6.50	8.14	1.17	0.24	1.53	0.37	0.08			
A1. I	.740	.196	.032	.039	.044	.152	.105	.087			.018	.003	.001			
2	45.64	19.50	3.47	3.34	3.04	4.45	11.57	6.96	0.16		2.44		0.19		100.76	
A2. II	.761	.191	.022	.046	.076	.089	.187	.074			.031		.003			
3	46.48	19.00	4.74	2.30	2.49	4.35	8.46	6.78	3.21		1.22	0.15	trace	CO ₂ 0.36 SO ₃ 0.19 Cl 0.08	99.91	2.58
A2. II	.775	.186	.030	.032	.062	.078	.136	.072			0.15	.001	—			
4	39.50	21.58	3.22	6.10	2.61	8.60	7.19	8.13	0.42		1.88	0.20		SO ₃ 0.05 S 0.18	99.66	2.801
A2. II	.658	.212	.020	.085	.065	.154	.116	.086			.024	.001				

RANG 1. PERALKALIC. ÜRTASE.

1	45.46	26.73	4.31	0.60	trace	2.09	15.07	4.23	0.44				0.12		99.05	
B3. IV	.758	.262	.027	.008	—	.037	.243	.045					.002			
2	45.43	28.77	3.10	0.40	0.22	1.86	16.16	3.38	n. d.						99.32	
A3. III	.757	.282	.019	.006	.006	.033	.261	.036								
3	45.28	27.37	3.53	0.49	0.33	1.22	17.29	3.51	0.40				0.19		99.53	
A3. III	.755	.268	.022	.007	.008	.022	.279	.037					.003			
4	43.02	24.63	3.59	2.17	1.96	5.47	14.81	2.99	n. d.		0.63	0.70			99.97	
A2. II	.717	.241	.022	.030	.049	.098	.239	.032			.008	.005				

ORDER 9. PERLENIC. LAPPARE. (C. I. P. W., 1902.)

SUBRANG 3. SODIPOTASSIC. ARKANSOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	II.9.1.3.⊙	an 1.11 di 9.50 lc 37.93 wo 8.58 ne 29.82 cs 2.06 mt 5.10 il 2.74 hm 1.60 ap 1.01	Diamond Jo Quarry, Maguet Cove, Arkansas.	H. S. Washing- ton.	H. S. Washington, J. G., IX, p. 616, 1901.	Arkite (leu- cite sye- nite).	In W. T., p. 307.
2	II(III).9.1.3(4).	lc 32.26 ac 10.16 ne 33.23 ns 5.86 di 1.76 ol 6.56 cs 6.19 il 4.71	Wudjavrtshor, Umptek, Kola, Finland.	V. Hackmann.	V. Hackmann, Fennia, XI, No. 2, p. 151, 1894.	Nephelite porphyry.	In W. T., p. 307.
3	II.(8)9.1.3(4).	or 6.95 ac 10.16 lc 25.94 di 1.76 ne 32.38 wo 0.46 mt 1.86 il 2.28 ap 0.34	Etinde Volcano, Kamerun.	M. Dittrich.	E. Esch, Sb. Pr. Ak., 1901, p. 299.	Leucitite.	Fresh? In W. T., p. 307.
4	II.9.1.3''.	an 2.78 ol 8.73 lc 24.42 cs 12.04 ne 32.94 mt 4.64 kp 9.48 il 3.65 ap 0.34	Niragongo, Lake Kivu District, German East Africa.	Klüss.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 25, 1912.	Leucite nephelinite.	

SUBRANG 4. DOSODIC. URTOSE. (C. I. P. W., 1902.)

1	''II.9.1.4''.	lc 19.62 ac 12.01 ne 61.63 di 2.23 wo 1.86 cs 1.03 mt 0.23	Lujavr Urt, Umptek, Kola, Finland.	W. Petersson.	W. Ramsay, G. F. F., XVIII, p. 462, 1896.	Urtite.	In W. T., p. 307.
2	(I)II.''9.1.4(5).	or 5.56 ac 6.93 lc 11.34 di 1.79 ne 69.86 wo 2.90 mt 0.93	Lujavr Urt, Umptek, Kola Finland.	A. Zilliacus.	W. Ramsay, G. F. F., XVIII, p. 462, 1896.	Urtite.	In W. T., p. 307.
3	''II.9.1.4(5).	lc 16.13 ac 10.16 ne 65.60 ns 3.17 di 2.57 ol 0.64 cs 0.95	Lujavr Urt, Umptek, Kola, Finland.	N. Sahlbom.	W. Ramsay, G. F. F., XVIII, p. 462, 1896.	Urtite.	In W. T., p. 307.
4	II.9.1.4(5).	lc 13.95 ac 10.16 ne 59.36 ns 0.98 di 5.78 cs 6.88 il 1.06 ap 1.68	Iivaara, Kuonosamo, Finland.	A. Zilliacus.	V. Hackmann, B. C. G. Finl., No. 11, p. 17, 1900.	Ijolite.	In W. T., p. 307.

CLASS III. SALFEMANE. (C. I. P. W., 1902.)

RANG 1. PERALKALIC. ROCKALLASE. (C. I. P. W., 1902.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	73.60	4.70	13.10	n. d.	0.11	0.37	6.96	trace	n. d.			trace	0.93	NiO 0.06	99.83	2.93
A3. III	1.227	.046	(.067)	(.030)	.003	.007	.113	—				—	.013			
2	69.80	5.10	13.23	0.78	0.11	0.72	8.04	0.22	0.46	0.31	0.34	0.07	0.12	CO ₂ none ZrO ₂ 1.17 SO ₃ none Cl none S none BaO none Ce ₂ O ₃ 0.37	100.84	
A1. I	1.163	.050	.083	.011	.003	.013	.130	.002			.004	—	.002			

CLASS III. SALFEMANE.

RANG 1. PERALKALIC. CUCULLASE. (H. S. WASHINGTON, 1917.)

1	67.35	8.21	10.81	3.63	0.09	0.11	7.25	3.35	n. d.						100.80	
B3. IV	1.123	.080	.063	.050	.002	.002	.117	.036								

RANG 1. PERALKALIC. CUCULLASE.

1	63.88	7.29	14.80	3.46	0.29	0.40	9.32	1.29	n. d.						100.73	
B3. IV	1.065	.071	.093	.048	.007	.007	.150	.014								
2	64.04	8.43	5.69	3.79	4.71	0.40	6.67	1.58	3.76			trace	trace		99.07	
B3. IV	1.067	.083	.036	.053	.118	.007	.108	.017				—	—		(100.07)	

RANG 1. PERALKALIC. CUCULLASE.

1	68.29	8.71	11.60	trace	0.40	0.51	10.63	0.67	n. d.						100.81	
B3. IV	1.138	.085	.073	—	.010	.009	.171	.007								

RANG 2. DOMALKALIC.

1	51.17	12.52	3.66	4.84	6.21	6.55	3.56	2.25	2.00	0.11	2.27	3.92	0.60		99.76	2.88
A2. II	.853	.123	.023	.067	.155	.117	.057	.024			.028	.027	.009			

RANG 3. ALKALICALCIC. VAALASE. (C. I. P. W., 1902.)

1	55.71	14.85	2.88	6.12	11.78	2.52	1.84	2.45	0.52		1.20	0.38	0.29		100.50	
A2. II	.929	.146	.018	.085	.295	.045	.030	.027			.015	.003	.004			
2	50.02	12.80	4.76	8.60	4.09	8.66	1.88	1.78	1.69	2.16	3.31	0.48			100.23	
A2. II	.834	.125	.030	.119	.102	.155	.030	.019			.041	.003				
3	59.90	11.55	0.87	4.59	7.15	10.60	1.78	2.86	0.37		0.57				100.24	
A3. III	.998	.113	.005	.064	.179	.189	.029	.031			.007					

ORDER 3. QUARFELIC. ATLANTARE. (C. I. P. W., 1902.)

SUBRANG 5. PERSODIC. ROCKALLOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	(II)III.(2)3.1.5. 1.1.1.5.4.	Q 37.80 ac 30.95 ab 24.10 di 1.70 hy 5.08	Rockall Island, northwest of Ireland.	C. J. S. Makins.	J. W. Judd, Tr. R. Ir. Ac., XXXI (II), p. 54, 1897.	Rockallite.	MnO high? In W. T., p. 311.
2	"III.3.1.5. 1.1.1.5.5.	Q 30.18 ac 37.88 or 1.12 di 2.64 ab 25.15 mt 0.23 Z 1.83 il 0.61 ap 0.17	Rockall Island, northwest of Ireland.	H. S. Washing- ton.	H. S. Washington, Q. J. G. S., LXX, p. 297, 1914.	Rockallite.	Part of same specimen as No. 1.

ORDER 4. QUARDOFELIC. VAALARE. (C. I. P. W., 1902.)

SUBRANG 3. SODIPOTASSIC.

1	(II)III.4.1.3. 1.1.1.5.5.	Q 18.72 ac 31.42 or 20.02 ns 0.61 ab 23.06 di 0.49 hy 6.54	Cocavera, Capo alla Cuculla, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 43, 1906.	Riebeckite granite.	
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SUBRANG 4. DOSODIC. CUCULLOSE. (H. S. WASHINGTON, 1917.)

1	III.4.1.4.⊙ 1.1.1.5.5.	Q 12.30 ac 42.97 or 7.78 di 1.70 ab 29.87 hy 6.14	Capo alla Cuculla, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 45, 1906.	Riebeckite syenite.	
2	(II)III.4.1.4. 1.1.1.3.	Q 14.46 ac 16.63 or 9.45 ns 0.73 ab 34.58 di 1.57 hy 18.03	Lumbwa, Uganda.	M. Goldschlag.	M. Goldschlag, N. J. Cb., 1912, p. 588.	Pantellerite.	

SUBRANG 5. PERSODIC.

1	(II)III.4.1.5". 1.1.1.5.5.	Q 17.82 ac 33.73 or 3.89 ns 2.44 ab 40.87 di 1.14 hy 0.10	Capo alla Cuculla, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 46, 1906.	Aegirite granite.	
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SUBRANG 4. DOSODIC.

1	(II)III.4(5).2.4. 3.1.1.2.	Q 7.98 hy 18.90 or 13.34 mt 5.34 ab 29.87 il 4.23 an 7.51 ap 9.07 C 1.63	Muottals da Pontresina, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Lampro- phyre.	
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SUBRANG 3. SODIPOTASSIC.

1	III.4.(2)3.3. 2.1.1.2.	Q 9.96 hy 36.89 or 15.01 mt 4.18 ab 15.72 il 2.28 an 9.73 ap 1.01 C 5.51	Usmi. Hyvinge, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 15, p. 55, 1905.	Quartz gabbro.	
2	(II)III.4"(3)4).3(4). 2.1.2.3.	Q 10.14 di 15.60 or 10.56 hy 8.93 ab 15.72 mt 6.96 an 21.13 il 6.23 ap 1.01	Analmainity, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 20, 1913.	Labradorite (basalt).	
3	"III.4"3.3. 1.1.2.2.	Q 9.90 di 30.37 or 17.24 hy 10.17 ab 15.20 mt 1.16 an 14.73 il 1.06	Tatarca River, Jenisei District, Siberia.	(?)	A. Meister, Reg. Aurif. Sib., IX, p. 152, 1910.	Pyroxene monzonite.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. VAALASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	50.99	12.40	2.10	11.80	4.09	6.46	2.38	2.19	1.21	0.12	4.66	1.86	0.11	CO ₂ trace S trace	100.37	
A2. II	.850	.122	.013	.164	.102	.115	.039	.023			.058	.013	.002			
2	50.85	12.54	10.03	7.11	5.57	9.33	2.37	1.13	0.34			0.76		SO ₂ 0.05	100.08	
A3. III	.848	.123	.062	.099	.139	.166	.039	.012				.005				
3	57.06	8.50	1.11	5.40	11.19	12.04	1.39	0.95	1.25	0.18	0.52	0.05	0.13	CO ₂ none ZrO ₂ none S none BaO trace SrO none	99.77	
A2. II	.951	.083	.007	.075	.280	.216	.023	.010			.007	—	.002			
4	55.87	13.52	2.70	5.89	6.51	8.87	2.42	1.72	1.56	0.09	0.56	0.25	0.10	BaO 0.02 SrO none Li ₂ O trace	100.08	
A2. II	.931	.132	.017	.082	.163	.159	.039	.018			.007	.002	.001			
5	50.57	11.70	12.36	5.89	3.98	7.89	3.70	0.82	1.44		1.02				99.37	2.913
B3. IV	.843	.115	.077	.082	.100	.141	.060	.009			.013					
6	52.47	11.75	6.13	6.92	4.33	7.55	2.85	2.31	2.15	0.14	2.39	0.26	0.19	CO ₂ 0.22 ZrO ₂ 0.12 SO ₃ 0.08 BaO 0.06 SrO 0.03	99.95	
A1. I	.875	.115	.038	.096	.108	.135	.046	.024			.030	.002	.003			
7	59.90	8.49	2.04	4.60	12.07	8.58	2.36	0.76	0.35	0.17	0.25	0.31		CO ₂ 0.45 SO ₃ 0.10	100.42	
A2. II	.998	.083	.013	.064	.302	.154	.038	.008			.003	.002				
8	50.47	12.41	8.78	3.89	5.73	10.19	2.57	1.19	1.09		1.51	1.31			99.14	2.909
B2. III	.841	.122	.055	.054	.143	.182	.041	.013			.019	.009				
9	53.39	12.18	6.18	6.70	6.17	6.80	2.70	1.76	2.09		1.39	0.25		CO ₂ 0.28 SO ₃ 0.24	100.13	
A2. II	.890	.119	.039	.093	.154	.121	.044	.019			.017	.002				
10	50.69	12.40	10.19	7.60	5.58	6.90	2.32	1.28	2.16		0.60				99.72	
A3. III	.845	.122	.064	.106	.140	.123	.037	.014			.008					
11	53.88	13.43	2.67	6.53	6.53	7.57	3.08	1.09	2.47		2.18	0.75	0.06		100.24	
A2. II	.898	.132	.017	.090	.163	.135	.050	.012			.027	.005	—			
12	52.05	13.61	5.22	6.54	5.23	9.57	2.54	1.28	1.83	0.16	1.77	0.33			100.13	
A2. II	.868	.133	.033	.091	.131	.171	.041	.014			.022	.002				
13	52.7	11.4	9.0	3.7	7.4	11.6	2.3	0.7	1.4						100.2	
B3. IV	.878	.112	.056	.051	.185	.207	.037	.007								
14	52.67	10.62	10.43	4.21	7.04	11.70	2.19	0.65	0.38						99.89	
A3. III	.878	.104	.065	.058	.176	.209	.035	.007								

RANG 3. ALKALICALCIC. VAALASE.

1	52.22	10.66	9.39	5.15	6.64	11.27	2.34	0.51	1.98						100.16	
A3. III	.870	.104	.059	.072	.166	.201	.038	.005								

ORDER 4. QUARDOFELIC. VAALARE—Continued.

SUBRANG 4. DOSODIC. VAALOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III.4(5).3.(3)4. 2.1.2.3.	Q 8.94 di 2.73 or 12.79 hy 21.35 ab 20.44 mt 3.02 an 16.68 il 8.82 ap 4.37	Rose's mill, Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, Va. G. S. B. III A, p. 95, 1913.	Gabbro.	
2	III.4''3''4. 2.1.2.3.	Q 8.70 di 17.14 or 6.67 hy 10.57 ab 20.44 mt 14.38 an 20.02 ap 1.68	Rockland Ridge, Columbia River, Washington.	E. A. Schneider.	E. A. Schneider, A. J. S., XXXVI, p. 237, 1888.	Augite andesite.	In W. T., p. 311.
3	III(IV).4.3(4).4''. 1.1.2.2.	Q 8.04 di 36.85 or 5.56 hy 19.77 ab 12.05 mt 1.62 an 13.90 il 1.06	Evans Creek, Riddles quadrangle, Oregon.	G. Steiger.	G. F. Kay, U. S. G. S. B. 419, p. 167, 1910.	Granodiorite?	
4	(II)III.4(5).3''4''. 2.1.2.2.	Q 8.46 di 17.27 or 10.04 hy 15.62 ab 20.44 mt 3.94 an 20.85 il 1.06 ap 0.67	Near Emigrant Gap, Placer County, California.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. B. 148, p. 212, 1897.	Gabbro.	In W. T., p. 311.
5	III.4 (5). (2).3. 3.1.2.3.	Q 8.52 di 20.52 or 5.00 hy 0.50 ab 31.44 mt 16.01 an 12.79 il 1.98 hm 1.28	Rio de Janeiro, Brazil.	T. L. Bailey.	E. O. Hovey, T. M. P. M., XIII, p. 216, 1892.	Diabase.	In W. T., p. 311
6	III(IV).4(5). (2)3''4. 2.1.2.3.	Q 8.58 di 18.51 or 13.34 hy 6.02 ab 24.10 mt 8.82 an 12.51 il 4.58 ap 0.67	Gansen, Holmestrand, Norway.	H. S. Washington.	Made for W. C. Brögger. (Unpublished.)	Essexitic lava.	
7	III.4.3.4''. 1.1.2.2.	Q 11.88 di 24.14 or 4.45 hy 23.83 ab 19.91 mt 3.02 an 10.29 il 0.46 ap 0.67	Mühlthal, Odenwald, Germany.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 15, 1906.	Gabbro.	Border of No. 78, III.5.3.4.
8	III.4''3.4. 2.1.2.2.	Q 9.24 di 18.14 or 7.23 hy 5.90 ab 21.48 mt 8.12 an 18.90 il 2.89 hm 3.20 ap 3.02	Kalte Buche, Roth, Rhöngebirge.	P. Schmidt.	P. Schmidt, N. J., 1905, II, p. 213.	Dolerite.	
9	(II)III.4''3.4. 2.1.2.3.	Q 9.06 di 12.98 or 10.56 hy 14.13 ab 23.06 mt 9.05 an 15.57 il 2.58 ap 0.67	Bielstein, Brocken, Harz.	Pufahl.	O. H. Erdmanns- doerfer, Jb. Pr. G. L.-A., XXVII, p. 359, 1906.	Biotite gabbro.	
10	III.4''3''4. 3.1.2.3.	Q 10.26 di 11.55 or 7.78 hy 12.97 ab 19.39 mt 14.85 an 19.74 il 1.22	Petris, Comitât Arad, Hungary.	K. Emszt.	P. Rozlozsnik, F. K., XXXV, p. 517, 1905.	Diabase.	Three decimals.
11	(II)III.4(5).3.4. 2.1.2.2.	Q 7.74 di 9.53 or 6.67 hy 13.25 ab 26.20 mt 3.94 an 19.46 il 4.10 ap 1.68	Monte Olivetto, n. Teolo, Euganean Hills, Italy.	M. Stark.	M. Stark, T. M. P. M., XXV, p. 331, 1906.	Dolerite.	
12	(II)III.4(5).3''4. 2.1.2.3.	Q 7.74 di 18.96 or 7.78 hy 8.68 ab 21.48 mt 7.66 an 21.68 il 3.34 ap 0.67	Andranomilevina, Sakalave District, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 20, 1913.	Labradorite (basalt).	
13	III.4''3(4).4''. 2.1.2.2.	Q 9.24 di 30.02 or 3.89 hy 4.60 ab 19.35 mt 11.83 an 18.90 hm 0.80	Oudedrift, n. Beaufort West, Cape Colony.	Wappler (student).	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine diabase.	In W. T., p. 311.
14	III.4.3(4).4''. 2.1.3.2.	Q 10.74 di 31.75 or 3.89 hy 2.90 ab 18.34 mt 13.46 an 17.24 hm 1.12	Nels Poort, n. Beaufort West, Cape Colony.	Holdermann (student).	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine diabase.	In W. T., p. 311.

SUBRANG 5. PERSODIC.

1	III.4.3''(4)5. 2.1.3.2.	Q 10.26 di 30.59 or 2.78 hy 3.96 ab 19.91 mt 13.69 an 16.96	Colesburg, Cape Colony.	A. Bernthsen.	E. Cohen, N. J. B. B., V, p. 245, 1887.	Diabase porphyrite.	In W. T., p. 311.
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CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. KOGHASE. (H. S. WASHINGTON, 1917.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	52.40	13.55	2.73	9.79	5.53	10.01	2.32	0.40	1.05	0.62	1.08	0.12	0.26	FeS ₂ 0.13 NiO trace BaO trace SrO none Li ₂ O none	99.99	
A2. II	.873	.133	.017	.137	.138	.178	.037	.004			.014	.001	.004			
2	56.18	14.76	2.12	6.98	8.11	7.97	1.62	0.80	1.37			0.08	0.17		100.16	
A3. III	.936	.145	.013	.097	.203	.143	.026	.009				—	.002			
3	42.10	12.06	1.10	8.43	5.62	8.63	1.97	1.12	3.80	0.20	10.15	3.77	0.63	CO ₂ none S none	99.58	
A2. II	.702	.118	.007	.117	.141	.154	.032	.012			.127	.027	.009			
4	52.94	14.22	2.08	8.11	6.99	10.92	1.40	0.49	1.56	0.12	0.73	0.08	0.35		99.99	2.980
A2. II	.882	.140	.013	.113	.175	.195	.023	.005			.009	—	.005			
5	51.92	14.13	2.97	6.92	8.22	11.53	1.38	0.47	1.07	0.10	0.83	0.04	0.14	CO ₂ 0.06	99.78	3.000
A2. II	.865	.138	.019	.096	.206	.205	.023	.005			.010	—	.002			
6	52.58	15.58	2.07	6.68	5.75	10.37	1.79	0.82	3.13	0.22	0.89	0.09	0.15	CO ₂ 0.22 S none BaO 0.03 SrO trace	100.37	
A2. II	.878	.153	.013	.093	.144	.186	.029	.009			.011	—	.002			
7	54.21	13.25	4.26	10.00	5.03	8.99	1.79	0.74	none		1.49	0.01	0.21	CO ₂ 0.04 S trace CaO trace CuO trace PbO none	100.02	
A2. II	.904	.130	.027	.139	.126	.161	.029	.008			.019	—	.003			
8	52.16	14.72	4.11	7.18	9.44	8.44	1.49	0.32	1.06		0.42	0.06	0.48	CO ₂ none FeS ₂ 0.29	100.17	
A2. II	.869	.144	.025	.100	.236	.150	.024	.003			.005	—	.007			
9	51.68	13.52	4.87	9.71	5.19	8.84	2.14	0.12	0.50		1.20	0.17	0.66	CO ₂ 0.04 ZrO ₂ trace SO ₃ 0.06 FeS ₂ 0.80 CaO 0.55 BaO none Cu 0.01 Pb 0.02	100.08	
A1. I	.861	.133	.030	.136	.130	.158	.034	.001			.015	.001	.009			
10	56.03	12.51	0.45	15.73	6.08	4.17	2.01	0.73	0.70		0.74		.019		99.34	
A2. II	.934	.122	.003	.218	.152	.075	.032	.008			.009		.003			
11	52.85	14.76	5.75	4.13	8.87	10.06	1.12	0.25	1.07		0.56	0.24			99.66	
A2. II	.881	.145	.036	.057	.222	.180	.018	.003			.007	.002				
12	50.19	15.34	7.43	4.65	6.69	11.32	1.82	0.63	0.34		2.24	0.14	trace		100.79	
A2. II	.837	.150	.046	.065	.167	.202	.029	.007			.028	.001				
13	51.97	15.16	1.94	12.50	4.74	9.36	1.30	0.40	0.53		1.55	0.16	0.06		99.67	
A2. II	.866	.148	.012	.174	.119	.167	.021	.004			.019	.001	.001			
14	51.94	15.36	3.11	9.81	4.93	10.54	0.77	0.49	0.43		1.53	0.85	0.21		100.01	
A2. II	.866	.150	.019	.136	.123	.188	.012	.005			.019	.006	.003			
15	52.38	14.06	6.86	4.82	8.02	7.12	1.78	1.26	0.62	0.52	1.95	0.36	0.04	SO ₃ none Cl trace NiO trace Li ₂ O none	99.79	2.920
A2. II	.873	.138	.043	.067	.201	.127	.029	.014			.024	.003	—			

ORDER 4. QUARDOFELIC. VAALARE—Continued.

SUBRANG 4-5. PRESODIC. KOGHOSE. (A. LACROIX, 1911.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III.4(5).4.(4)5. 2.1.2.3.	Q 6.96 di 19.08 or 2.22 hy 18.34 ab 19.39 mt 3.94 an 25.58 il 2.13	Pine Hill, South Britain, Connecticut.	W. F. Hille- brand.	W. H. Hobbs, U. S. G. S. A. R. 17, III, p. 60, 1901.	Olivine basalt.	In W. T., p. 329.
2	III.4.4.4. 1.1.1.2.	Q 11.88 di 9.49 or 5.00 hy 27.04 ab 13.62 mt 3.02 an 28.08	Rock Creek Tunnel, Wash- ington, District of Columbia.	L. G. Eakins.	G. H. Williams, U. S. G. S. B. 148, p. 85, 1897.	Hornblende diorite.	In W. T., p. 311.
3	III.4''(3)4.4. 3.1.2.3.	Q 8.94 hy 14.10 or 6.67 il 19.30 ab 16.77 hm 1.12 an 20.57 ap 9.07	Near James River Gap. Virginia.	W. M. Thorn- ton.	T. L. Watson, pers. com.	Gabbro.	
4	III.4(5).4.4''. 1.1.1.3.	Q 8.16 di 18.86 or 2.78 hy 20.94 ab 12.05 mt 3.02 an 31.14 il 1.37	Moyie Sill, Purcell Moun- tains, British Columbia.	M. Dittrich.	R. A. Daly, Rosenb. Fests., p. 218, 1906.	Gabbro.	Also in Can. G. S. Mem. 38 (1), p. 234, 1912.
5	III.4(5).4.4''. 1.1.2.2.	Q 6.42 di 21.29 or 2.78 hy 19.44 ab 12.05 mt 4.41 an 30.58 il 1.52	Moyie Sill, Purcell Moun- tains, British Columbia.	M. Dittrich.	R. A. Daly, A. J. S., XX, p. 193, 1905.	Hornblende gabbro.	Also in Can. G. S. Mem. 38 (1), p. 224, 1912.
6	(II)III.4(5).4.4. 2.1.2.3.	Q 7.86 di 16.08 or 5.00 hy 15.94 ab 15.20 mt 3.02 an 31.97 il 1.67	Riddles quad- rangle, Oregon.	G. Steiger.	G. F. Kay, U. S. G. S. B. 419, p. 167, 1910.	Basaltic greenstone.	
7	(II)III.4.4.4. 2.1.1.3.	Q 14.46 di 7.58 or 4.45 hy 21.52 ab 15.20 mt 6.26 an 25.85 il 2.89	Demerara River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Gui., p. 95, 1908.	Quartz diabase.	Average sample. Incorrect in W. T., p. 439.
8	III.4(5).4.(4)5. 2.1.1.2.	Q 7.62 di 7.39 or 1.67 hy 30.21 ab 12.58 mt 5.80 an 32.53 il 0.77	Upper Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, R. G. N. W. Dist., Pt. II, p. 9, 1898.	Diorite.	In W. T., p. 333.
9	III.4''4.5. 2.1.2.3.	Q 10.08 di 13.11 or 0.56 hy 19.70 ab 17.82 mt 6.96 an 27.24 il 2.28 ap 0.34	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Gui., p. 95, 1908.	Diabase.	In W. T., p. 311.
10	III.4.(3)4.4. 1.1.1.3.	Q 10.98 hy 42.79 or 4.45 mt 0.70 ab 16.77 il 1.37 an 20.85 C 0.71	Burnt Hill, King Charles Land, Spitzbergen.	N. Sahlbom.	A. Hamberg, G. F. F., XXI, p. 523, 1899.	Hypersthene andesite.	In W. T., p. 421.
11	(II)III.4.4.(5). 4.(5). 2.1.2.2.	Q 13.32 di 10.68 or 1.67 hy 19.05 ab 9.43 mt 8.35 an 34.47 il 1.06 ap 0.67	Godinyesd, Comitat Hunyad, Hungary.	K. Emszt.	P. Rozlozsnik, F. K., XXXV, p. 530, 1905.	Olivine basalt.	Three decimals.
12	III.4(5).4.4. 2.1.2.2.	Q 8.46 di 18.36 or 3.89 hy 8.20 ab 15.20 mt 8.58 an 31.69 il 4.26 hm 1.44 ap 0.34	Maraho Volcano, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 129, 1909.	Olivine basalt.	
13	III.4''4''4''. 2.1.2.3.	Q 10.02 di 9.56 or 2.22 hy 25.97 ab 11.00 mt 2.78 an 34.19 il 2.89 ap 0.34	Mihara Volcano, Oshima, Seven Izu Islands, Japan.	Takayanagi.	S. Kozu, pers. com.	Andesitic basalt.	
14	(II)III.4.(4)5.4. 2.1.2.3.	Q 14.34 di 8.07 or 2.78 hy 21.62 ab 6.29 mt 4.41 an 36.97 il 2.89 ap 2.02	Mihara Volcano, Oshima, Seven Izu Islands, Japan.	Takayanagi.	S. Kozu, pers. com.	Andesitic basalt.	Eruption of 1912.
15	(II)III.4.4.''4. 2.1.2.2.	Q 12.48 di 4.75 or 7.78 hy 17.90 ab 14.67 mt 9.98 an 26.41 il 3.65 ap 1.01	Jim Jim, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 35, 1912.	Andesite- basalt.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. KOGHASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16	52.00	10.72	2.50	11.61	3.63	16.02	0.78	0.37	0.18	0.14	1.40	0.11	0.25	CO ₂ 0.05 ZrO ₂ none Cl trace F none S trace Cr ₂ O ₃ trace V ₂ O ₅ 0.05 NiO none BaO 0.01 SrO none	99.82	3.144
A1 I	.867	.105	.016	.161	.091	.285	.013	.004			.018	.001	.004			
17	44.17	10.57	9.20	10.92	4.56	9.12	1.94	0.16	2.28	0.16	4.99	0.40	0.51	CO ₂ 0.35 ZrO ₂ none Cr ₂ O ₃ none V ₂ O ₅ 0.19 BaO 0.01	99.79	3.27
A1. I	.736	.104	.058	.151	.114	.163	.031	.002			.062	.003	.007			
18	53.60	13.25	2.32	7.48	5.15	9.30	1.87	1.09	1.47	0.76	3.53	0.15	0.15	CO ₂ none SO ₃ 0.24	100.36	
A2. II	.893	.130	.014	.104	.129	.166	.030	.012			.044	.001	.002			
19	56.63	9.70	1.44	7.66	11.52	9.22	1.42	0.15	0.87		0.37	0.03	0.30		99.31	
B2. III	.944	.095	.009	.107	.288	.164	.023	.002			.005	—	.004			

RANG 5. PERCALCIC.

1	57.29	12.07	0.89	5.70	4.02	17.77	0.39	trace	0.31	0.37	0.70	0.04	0.58		100.13	
A2. II	.955	.118	.006	.079	.101	.318	.006	—			.009	—	.008			
2	50.00	13.91	3.92	5.63	6.97	14.62	0.48	0.65	0.38	0.12	1.82	(0.71)	0.32	FeS ₂ 0.03	99.56	3.05
A2. II	.833	.136	.024	.078	.174	.261	.008	.007			.023		.005			

CLASS III. SALFEMANE.

RANG 1. PERALKALIC. ORENDASE. (C. I. P. W., 1902.)

1	54.17	10.16	3.34	0.65	6.62	4.19	1.21	11.91	1.01	0.52	2.67	1.59	0.06	CO ₂ 0.49 ZrO ₂ 0.22 SO ₃ 0.16 Cl 0.06 F 0.36 Cr ₂ O ₃ 0.05 NiO trace BaO 0.59 SrO 0.18 Li ₂ O trace	100.21	2.699
A1. I	.903	.100	.021	.009	.166	.075	.019	.127			.033	.011	.001			
2	54.08	9.49	3.19	1.03	6.74	3.55	1.39	11.76	2.71	0.79	2.08	1.35	0.05	SO ₃ 0.29 Cl 0.04 F 0.49 Cr ₂ O ₃ 0.07 BaO 0.57 SrO 0.20 Li ₂ O trace	99.97	2.686
A1. I	.901	.093	.020	.014	.169	.064	.022	.125			.026	.010	—			
3	51.07	9.93	2.72	1.19	10.31	4.87	0.82	9.92	2.19	2.04	2.13	1.53	0.04	CO ₂ none SO ₃ 0.33 BaO 0.57	99.66	
A2. II	.851	.097	.017	.017	.258	.088	.013	.105			.027	.011	—			
4	50.78	9.05	2.96	3.64	14.29	5.29	1.05	7.39	2.53		1.28	1.31	0.09	CO ₂ 0.46	100.15	
A2. II	.846	.089	.019	.050	.357	.095	.017	.079			.016	.009	.001			

ORDER 4. QUARDOFELIC. VAALARE—Continued.

SUBRANG 4-5 PRESODIC KOGHOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	III.4.4''4. 1.1.3.4.	Q 10.32 di 45.80 or 2.22 hy 3.21 ab 6.81 mt 3.71 an 24.46 il 2.74 ap 0.34	Broken Hill, New South Wales.	Not stated.	A. R. Dep. Min. N. S. W. (1909), p. 198, 1910.	Pyroxenite.	
17	III.4''4.5. 3.1.2.3.	Q 9.72 di 18.33 or 1.11 hy 7.54 ab 16.24 mt 13.46 an 19.74 il 9.42 ap 1.01	Marifana Mine, Kalgoorlie, West Australia.	H. Bowley.	E. S. Simpson, W. Aust. G. S. B. 42 (1), p. 132, 1912.	"Basic peg- matite" (hornblen- dite).	
18	(II)III.4''4.4. 2.1.2.3.	Q 12.06 di 16.84 or 6.67 hy 11.10 ab 16.77 mt 3.25 an 24.46 il 6.69 ap 0.34	Kirwans Hill, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Diabase.	
19	III''4.4''5. 1.1.2.2.	Q 10.50 di 21.07 or 1.11 hy 31.44 ab 12.05 mt 2.09 an 19.46 il 0.76	Mount Koghi, New Caledonia.	Boiteau.	A. Lacroix, C. R., CLII, p. 820, 1911.	Quartz diorite.	

SUBRANG. NOT NEEDED.

1	III.(3)4.5.0.	Q 18.96 di 39.67 or — wo 8.83 ab 3.14 mt 1.39 an 31.14 il 1.37	Hiriart Hill, Pala, San Diego County, - California.	W. T. Shaller.	W. T. Schaller, U. S. G. S. rec. lab.	Quartz- augite rock.	Igneous?.
2	III.4''5.0.	Q 9.06 di 31.01 or 3.89 hy 7.38 ab 4.19 mt 5.57 an 33.64 il 3.50 ap 0.71	Zeia River, Amur District, Siberia.	P. Todakis.	E. Ahnert, Reg. Aurif. Sib., X, Table VII, 1910.	Gabbro.	"P ₂ O ₅ "= Ca ₃ P ₂ O ₈ .

ORDER 5. PERFELIC. GALLARE. (C. I. P. W., 1902.)

SUBRANG 1. PERPOTASSIC. ORENDOSE. (C. I. P. W., 1902.)

1	''III.5.1.1. 2.1.2.1.	or 55.60 ac 8.78 ks 4.16 di 4.54 hy 14.50 il 1.52 hm 0.32 tn 2.55 pf 1.56 ap 3.70	North Table Butte, Leucite Hills, Wyoming.	W. F. Hille- brand.	W. Cross, A. J. S., IV, p. 130, 1897.	Orendite.	In W. T., p. 313.
2	III.5.1.1.⊙ 2.1.2.1.	Q 1.32 ac 9.24 or 51.71 ns 0.24 ks 4.93 di 5.62 hy 14.30 il 2.13 tn 2.35 ap 3.36	15-mile Spring, Leucite Hills, Wyoming.	W. F. Hille- brand.	W. Cross, A. J. S., IV, p. 130, 1897.	Orendite.	In W. T., p. 313.
3	''III.5.1.1. 2.3.2.1.	or 53.93 ac 6.01 ks 1.23 di 9.72 hy 2.50 ol 13.16 il 2.58 hm 2.72 pf 1.36 ap 3.70	Hallock Butte, Leucite Hills, Wyoming.	C. Palmer.	W. Cross, U. S. G. S. B. 512, p. 11, 1912.	Orendite.	
4	III.5.1.1(2). 1.3.2.1.	or 43.92 ac 3.23 ab 4.72 di 14.17 ne 0.28 ol 22.56 mt 2.78 il 2.43 ap 3.02	Jumilla, Murcia, Spain.	M. Dittrich.	A. Osann, Rosenb. Fests., p. 290, 1906.	Jumillite.	

CLASS III. SALFEMANE—Continued.

RANG 1. PERALKALIC. ORENDASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	57.13	10.28	1.90	4.11	9.73	3.37	2.56	6.07	2.55		1.60	0.82	0.09	CO ₂ 0.07	100.28	
A2. II	.952	.101	.012	.057	.243	.061	.041	.065			.020	.006	.001			
2	48.81	8.17	3.46	3.22	14.84	7.06	1.71	5.73	3.46		1.34	1.39	trace	CO ₂ 0.81 BaO 0.25 SrO 0.09	100.34	
A2. II	.814	.080	.022	.044	.371	.126	.027	.061			.017	.010				
3	48.45	11.80	9.15	0.96	4.00	5.59	4.18	7.05	3.02		1.96	3.76	0.20	SO ₂ 0.20 Cl trace	100.32	2.759
A2. II	.808	.116	.058	.014	.100	.100	.068	.075			.025	.026	.003			
4	55.56	10.70	2.00	5.19	4.56	8.42	1.45	7.48	1.45	1.42	0.81		0.61		99.65	2.67
A2. II	.926	.105	.013	.072	.114	.150	.023	.080			.010		.009			

RANG 1. PERALKALIC. ORENDASE.

1	50.00	9.87	3.46	5.01	11.92	8.31	2.41	5.02	1.16	0.17	0.73	0.81	trace	CO ₂ 0.31 SO ₂ 0.02 Cl 0.08 F 0.16 Cr ₂ O ₃ 0.11 NiO 0.07 BaO 0.32 SrO 0.07 Li ₂ O trace	100.01	
A1. I	.833	.096	.022	.069	.298	.148	.039	.053			.009	.006	—			

RANG 1. PERALKALIC. ORENDASE.

1	49.57	9.61	5.59	4.59	1.28	13.91	4.90	3.23	0.38		0.65	5.98	0.57	CO ₂ none	100.26	
A2. II	.826	.094	.035	.064	.032	.248	.079	.034			.008	.042	.008			
2	60.09	11.02	6.10	4.45	2.45	5.62	7.12	2.53	0.48				0.45		100.31	
A3. III	1.002	.108	.038	.062	.061	.100	.115	.027					.006		(100.48)	
3	49.20	9.23	7.73	3.24	1.35	11.55	6.20	1.96	2.20		7.13	0.06			99.85	
A2. II	.820	.090	.048	.045	.034	.206	.100	.021			.089	—				

RANG 1. PERALKALIC. ORENDASE.

1	32.83	9.24	35.77	14.84	0.47	0.55	4.92	0.86	0.35		0.62	trace	0.05	S 0.03	100.53	
A2. II	.547	.091	.224	.206	.012	.010	.088	.009			.008	—	—			

RANG 2. DOMALKALIC. KILAUASE. (C. I. P. W., 1902.)

1	52.26	10.63	2.47	5.45	9.32	5.62	1.60	5.99	1.97	0.98	1.92	0.98	0.12	CO ₂ 0.75 ZrO ₂ 0.08	100.14	
A2. II	.871	.104	.015	.076	.233	.100	.026	.064			.024	.007	.002			
2	50.86	11.14	2.93	5.21	11.26	6.97	1.73	5.85	0.95	0.64	0.84	0.79	0.13	CO ₂ none ZrO ₂ 0.02 S 0.02 Cr ₂ O ₃ 0.11 V ₂ O ₅ none NiO 0.04 BaO 0.31 SrO 0.22	100.02	
A1. I	.848	.109	.018	.072	.282	.125	.027	.063			.011	.006	.002			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 2. DOPOTASSIC. FORTUNOSE. (H. S. WASHINGTON, 1917.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III.5.1.2(3). 1.1.2.2.	Q 0.66 ac 2.31 or 36.14 di 9.02 ab 18.86 hy 24.13 mt 1.62 il 3.04 ap 2.02	Fortuna, Murcia, Spain.	M. Dittrich.	A. Osann, Rosenb. Fests., p. 277, 1906.	Fortunite (verite?).	Verite. Rosen. Fests., p. 307, 1906.
2	III.5.1.2.⊙ 1.3.2.2.	or 33.92 ac 3.70 ab 6.29 di 20.19 ne 1.99 ol 20.69 mt 3.25 il 2.58 ap 3.36	Jumilla, Murcia, Spain.	M. Dittrich.	A. Osann, Rosenb. Fests., p. 290, 1906.	Jumillite.	Not fresh.
3	(II)III.5.1.2(3). 2.2.3.2.	or 41.70 ac 12.47 ab 14.41 di 1.08 ne 3.83 ol 6.65 il 2.58 hm 4.96 pf 1.09 ap 8.74	Michelsberg, Katzenbuckel, Odenwald, Germany.	O. N. Heidenreich.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 315, 1907.	Tinguaite.	
4	III.5.1.2. 1.1.3.3.	or 44.48 di 33.54 ab 11.53 ol 1.97 an 0.56 mt 3.02 ne 0.28 il 1.52	Studencho, n. Eule, Bohemia.	J. Friedrichsen.	V. Rosicky, Sb. Böhm. Ges. W., 1901, XXX, p. 29.	Augite minette.	MnO high?

SUBRANG 3. SODIPOTASSIC.

1	III.5(6).1.3. 2.2.2.2.	or 29.47 di 27.33 ab 9.96 ol 15.61 an 1.11 mt 5.10 ne 5.68 il 1.37 ap 2.02	Beaver Creek, Bearpaw Mountains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., I, p. 360, 1896.	Shonkinite.	In W. T., p. 339.
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SUBRANG 4. DOSODIC. PIENAROSE. (H. A. BROUWER, 1910.)

1	III.5.1.(3)4. 2.1.4.4.	or 18.90 ac 8.78 ab 31.44 di 18.82 wo 3.25 mt 3.71 il 1.22 ap 14.11	Ahvenvaara, Kuuosamo, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 11, p. 36, 1900.	Pyroxene- apatite syenite.	In W. T., p. 313.
2	(II)III.5.1.4. 1.1.3.3.	Q 1.68 ac 12.47 or 15.01 di 23.14 ab 42.44 hy 2.09 mt 2.55	Mount Firsowaya, Ilmen Moun- tains, Russia.	J. Morozewicz.	A. Karpinsky, Ref. N. J., 1903, II, p. 369.	Augite syenite.	
3	III.5.1.4. 1.1.4.4.3.	or 11.68 ac 14.32 ab 30.92 di 7.34 ne 2.84 wo 14.85 il 6.84 hm 2.72 pf 5.98	Leeuwfontein, n. Pretoria, Transvaal.	F. Pisani.	H. A. Brouwer, Trans. Nephysy, p. 50, 1910.	Pienarite (aegirite phonolite).	

SUBRANG 5. PERSODIC. GELLIVAROSE. (H. S. WASHINGTON, 1917.)

1	III.5.1.5. 5.1.1.0.	or 5.00 ac 2.77 ab 39.50 ol 0.84 ne 1.99 mt 45.94 il 1.22 hm 3.20	Kapten, Gellivare, Sweden.	G. Nyblom.	A. G. Högbom, G. F. F., XXXII, p. 569, 1910.	Magnetite syenite porphyry.	
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SUBRANG 2. DOPOTASSIC. PROWERSOSE. (C. I. P. W., 1902.)

1	III.5.(1)2.2. 2.2.2.2.	or 35.58 di 13.90 ab 13.62 hy 15.17 an 3.89 ol 4.77 mt 3.48 il 3.65 ap 2.35	Burkettville, Knox County, Maine.	G. Steiger.	E. S. Bastin, J. G., XIV, p. 179, 1906.	Syenite porphyry.	Not fresh.
2	III.5.2.2. 2.3.2.2.	or 35.03 di 19.82 ab 10.48 ol 17.64 an 5.28 mt 4.18 ne 1.99 il 1.67 ap 2.02	Wildcat Gulch, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Shonkinite.	

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. KILAUAUSE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3	50.41	12.30	5.71	3.06	8.69	7.08	0.97	7.53	1.80	0.46	1.47	0.46	0.15	ZrO ₂ none Cl trace S none NiO 0.04 BaO 0.23 SrO 0.06 Li ₂ O trace	100.42	2.88
A1. I	.840	.120	.036	.043	.217	.127	.016	.080			.018	.003	.002			
4	56.72	11.05	2.53	3.59	9.91	2.90	1.43	6.62	2.76		1.37	0.95	trace	BaO 0.09	99.92	
A2. II	.945	.109	.016	.050	.248	.052	.023	.070			.017	.007	—			
5	43.37	9.96	9.64	8.78	5.62	9.23	0.97	4.76	1.24	0.07	4.69	1.82			100.15	3.13
A2. II	.723	.098	.060	.122	.141	.164	.016	.051			.059	.013				

RANG 2. DOMALKALIC. KILAUAUSE.

1	47.32	11.22	2.91	5.81	15.96	7.11	1.88	3.79	1.71	0.31	0.75	0.61	0.11	CO ₂ 0.13 Cr ₂ O ₃ trace NiO trace BaO 0.22 SrO 0.05 Li ₂ O trace	99.89	
A1. I	.789	.110	.018	.080	.399	.127	.030	.040			.009	.004	.002			
2	53.32	14.16	2.15	5.08	7.90	7.12	2.39	4.80	1.24	0.26	0.90	0.66	0.10	BaO 0.12 SrO 0.05	100.25	2.831
A2. II	.889	.138	.014	.071	.198	.127	.039	.051			.023	.005	.001			
3	48.84	13.83	2.92	12.24	2.18	6.05	3.20	3.59	1.01	0.22	4.39	0.73	0.22	S 0.15 BaO 0.01	99.58	
A2. II	.814	.136	.018	.170	.055	.108	.052	.038			.055	.005	.003			
4	51.22	12.28	6.08	4.86	9.62	6.78	2.54	3.26	2.60		0.54	0.37			100.15	2.818
A2. II	.854	.120	.038	.068	.241	.121	.041	.035			.007	.003				
5	51.13	12.79	4.34	5.09	3.60	12.39	2.58	5.12	0.74		0.97	1.26	0.21		100.22	
A2. II	.852	.125	.027	.071	.090	.221	.042	.054			.012	.009	.003			
6	51.98	11.37	1.47	6.46	8.84	8.24	2.63	4.07	2.31	0.09	1.52	0.68			99.76	
A2. II	.866	.111	.009	.090	.221	.147	.042	.043			.019	.005				
7	50.32	14.51	3.84	5.32	6.97	7.70	3.84	3.60	2.01		1.51	0.26			99.88	2.85
A2. II	.839	.142	.024	.074	.174	.138	.062	.038			.019	.002				
8	49.25	9.26	2.07	6.91	13.84	7.48	2.65	3.22	2.36	0.37	1.32	1.38			100.11	2.92
A2. II	.821	.091	.013	.096	.346	.134	.043	.034			.017	.010				
9	49.05	12.88	2.04	6.87	8.20	6.96	3.42	3.81	1.93	0.32	3.75	0.65			99.88	
A2. II	.818	.126	.013	.095	.205	.124	.055	.040			.047	.005				
10	48.05	13.42	3.54	7.68	6.41	9.05	3.06	3.85	1.55		2.96	0.58		SO ₂ 0.12	100.27	2.874
A2. II	.801	.132	.022	.107	.160	.162	.049	.041			.037	.004				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 2. DOPOTASSIC. PROWERSOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	III.5.2''2. 2.2.2.2.	or 44.48 di 20.09 ab 4.19 ol 8.82 an 6.67 mt 6.26 ne 2.27 il 2.74 hm 1.44 ap 1.01	Two Buttes, Prowers County, Colorado.	W. F. Hille- brand.	W. Cross, J. G., XIV, p. 168, 1906.	Syenitic lampro- phyre.	In W. T., p. 313.
4	(II)III.5.(1)2.2. 2.1.1.2.	Q 4.62 di 2.84 or 38.92 hy 25.71 ab 12.05 mt 3.71 an 4.45 il 2.58 ap 2.35	Fortuna, Murcia, Spain.	M. Dittrich.	A. Osann, Rosenb. Fests., p. 277, 1906.	Fortunite (trachyte).	
5	III.5.2''2. 3.1.2.3.	Q 1.50 di 19.50 or 23.36 hy 5.43 ab 8.38 mt 13.92 an 8.62 il 8.97 ap 4.37	Voralp, Aarmassif, Switzerland.	O. Fischer.	O. Fischer, T. M. P. M., XXIV, p. 77, 1905.	Hornblende minette.	

SUBRANG 3. SODIPOTASSIC. LAMAROSE. (C. I. P. W., 1902.)

1	III.5''2(3).3. 1.4.2.2.	or 22.24 di 16.27 ab 9.43 ol 28.07 an 11.12 mt 4.18 ne 3.41 il 1.37 ap 1.34	Sunlight Valley, Yellowstone National Park.	H. N. Stokes.	Hague and Jaggard, U. S. G. S. B. 168, p. 97, 1900.	Leucite absarokite.	In W. T., p. 313.
2	(II)III.5.2(3)''3. 2.2.2.2.	or 28.36 di 13.68 ab 20.44 hy 9.12 an 13.34 ol 6.30 mt 3.25 il 3.50 ap 1.68	Pend d'Oreille River, Nelson Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 307, 1912.	Augite minette.	
3	(II)III.5.2''3''. 2.2.2.4.	or 21.13 di 10.62 ab 27.25 hy 8.94 an 12.79 ol 3.29 mt 4.18 il 8.36 ap 1.68	Norrstrand, N. Ulön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 116, 1913.	Kentallenite.	
4	III.5.2(3).3. 2.1.2.2.	or 19.46 di 14.66 ab 21.48 hy 16.55 an 12.23 ol 2.20 mt 8.32 il 1.06 ap 1.01	Niederthalheim, n. Aachen, Rheinland.	A. Lindner.	E. Dathe, Jb. Pr. G. L.-A., XIX, p. CXXIX, 1899.	Vogesite.	Not in W. T.
5	III.5''2.3. 2.1.3.3.	or 30.02 di 28.12 ab 13.10 wo 4.29 an 8.06 mt 6.36 ne 4.83 il 1.82 ap 3.02	Forcella, Canzacoli, n. Predazzo, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak., 1904, p. 36.	Shonkinite.	
6	III.5.2.3.○ 1.2.2.2.	or 23.91 di 23.85 ab 22.01 hy 1.70 an 6.39 ol 12.35 mt 2.09 il 2.89 ap 1.68	Piz Posta Bialla, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Hornblende syenite.	
7	(II)III.5(6).2.3(4). 2.2.2.2.	or 21.13 di 19.64 ab 22.01 ol 9.70 an 11.68 mt 5.57 ne 5.68 il 2.89 ap 0.67	Posta Bialla Glacier, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Syenite.	
8	III.5.(1)2.3. 1.3.2.2.	or 18.90 di 19.24 ab 21.74 ol 24.41 an 3.89 mt 3.02 ne 0.43 il 2.58 ap 3.36	Gliemsastockli, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Basic syenite.	
9	III.5.2.3''. 2.3.2.2.	or 22.24 di 16.77 ab 22.53 ol 12.25 an 8.62 mt 3.02 ne 3.41 il 7.14 ap 1.68	Monte Boes, n. Pozzo Maggiore, Sardinia.	H. S. Washing- ton.	H. S. Washington, C. R. Cong. G. Int., XII, p. 231, 1914.	Basalt.	
10	III.5(6).2''3. 2.2.2.3.	or 22.80 di 23.91 ab 14.15 ol 7.91 an 11.68 mt 5.10 ne 6.25 il 5.62 ap 1.34	Muhawura, Lake Kivu District, German Central Africa.	Klöss.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 18, 1912.	Leucite basanite.	

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. KILAUSE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
11	48.75	13.50	11.21	4.83	3.73	9.51	2.96	3.34	0.33		0.88	0.48		BaO 0.48	100.00	2.78
A2. II	.813	.132	.070	.067	.093	.170	.048	.035			.011	.003				
12	47.02	12.52	4.81	5.83	9.92	8.38	3.23	3.23	0.70	0.69	2.60	1.23	0.12	CO ₂ trace SO ₂ none Cl trace Li ₂ O trace	100.23	2.888
A2. II	.784	.123	.030	.081	.248	.150	.052	.034			.033	.008	.002			

RANG 2. DOMALKALIC. KILAUSE.

1	46.52	10.48	4.40	7.79	10.58	9.49	3.12	1.55	1.79		2.98	0.83	0.11	CO ₂ trace X 0.73 Li ₂ O trace	100.37	2.99
A2. II	.775	.103	.028	.108	.265	.169	.050	.016			.037	.006	.002			
2	48.16	12.85	2.79	7.11	10.45	8.13	3.18	2.79	1.47	0.45	1.50	0.70	0.14	ZrO ₂ trace S 0.07 Cr ₂ O ₃ 0.04 NiO 0.04 BaO 0.25 SrO 0.15 Cu trace	100.23	
A1 I	.803	.126	.018	.099	.261	.145	.052	.030			.019	.005	.002			
3	52.85	13.25	2.36	8.71	6.84	8.47	4.72	1.53	0.93		0.35	0.40			100.41	2.93
A2. II	.881	.130	.015	.121	.171	.151	.076	.016			.004	.003				
4	53.29	8.81	4.68	6.66	9.07	8.99	3.21	1.87	1.51	0.17	1.41	trace		CO ₂ none	99.67	
A2. II	.886	.086	.029	.093	.227	.161	.052	.020			.018	—				
5	47.87	13.25	2.86	12.90	2.83	7.60	4.80	2.21	1.00	0.36	1.51	1.96	0.32	CO ₂ none Cl 0.21 S 0.10	100.48	
A2. II	.798	.130	.018	.179	.071	.136	.077	.023			.019	.014	.005			
6	49.17	12.22	3.10	13.31	5.01	6.42	4.07	1.09	2.25	0.60	2.33	0.25	0.39	CO ₂ 0.16	100.37	2.96
A2. II	.820	.120	.019	.185	.125	.114	.066	.012			.029	.002	.005			
7	47.95	13.14	12.23	3.44	6.16	8.59	4.10	1.80	0.40	0.23	0.43	0.99		SO ₃ 0.46	99.92	
A2. II	.799	.129	.077	.048	.154	.154	.066	.020			.005	.007				
8	45.80	10.13	3.93	6.95	12.48	9.52	2.60	1.90	2.71		2.09	1.84			99.95	
A2. II	.763	.099	.024	.097	.312	.170	.042	.020			.026	.013				
9	51.21	7.98	8.85	6.54	7.13	9.92	2.77	1.31	0.93	0.19	1.51		1.58		99.92	2.877
A2. II	.854	.078	.055	.090	.178	.177	.045	.014			.019		.023			
10	46.03	12.01	4.37	6.85	5.22	11.71	3.27	2.24	2.69		3.23	2.51	0.26	CO ₂ trace Cl trace	100.39	2.852
A2. II	.767	.118	.023	.095	.131	.209	.053	.023			.040	.018	.004			
11	43.35	11.46	11.98	2.26	11.69	7.76	3.88	0.99	2.41	0.59	2.43	1.54			100.34	2.974
A2. II	.723	.112	.075	.031	.292	.138	.063	.011			.030	.011				
12	46.18	14.26	6.93	5.72	7.23	8.24	4.75	1.32	2.14		2.27	0.51			99.55	
A2. II	.770	.140	.043	.079	.181	.147	.077	.014			.028	.004				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 3. SODIPOTASSIC. LAMAROSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
11	(II)III.5.2(3).3'' 3.1.3.3.	Q 0.78 di 20.09 or 19.46 wo 2.09 ab 25.15 mt 12.99 an 13.62 il 1.67 hm 2.24 ap 1.01	Sorimandi Volcano, Sumbawa Island, Dutch East Indies.	A. Lindner.	G. Rack, N. J. B. B., XXXIV, p. 71, 1912.	Leucite tephrite.	Norm and mode?
12	III.5'' 2.3(4). 2.3.2.2.	or 18.90 di 18.57 ab 18.34 ol 12.98 an 10.29 mt 6.96 ne 4.83 il 5.28 ap 2.69	Woodend, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, Vict. G. S. B. 24, p. 31, 1912.	Woodendite (orthoclase basalt).	

SUBBRANG 4. DOSODIC. KILAUESE. (C. I. P. W., 1902.)

1	III.5.2(3).4. 2.2.2.2.	or 8.90 di 24.73 ab 24.63 ol 14.06 an 10.29 mt 6.50 ne 0.85 il 5.62 ap 2.02	Volcano Butte, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 130, 1896.	Basalt.	In W. T., p. 315.
2	III.5(6).2(3).(3)4. 2.3.2.3.	or 16.68 di 18.92 ab 18.34 ol 13.23 an 12.23 mt 4.18 ne 4.83 il 2.89 ap 1.68	Pilot Knob, Routt County, Colorado.	W. F. Hille- brand.	H. S. Gale, U. S. G. S. B. 419, p. 118, 1910.	Olivine basalt.	
3	''III.5.2.4''. 1.2.2.3.	or 8.90 di 23.47 ab 35.12 ol 13.95 an 10.58 mt 3.48 ne 2.56 il 0.61 ap 1.01	Cerro San Miguel, Atlixco, Puebla, Mexico.	A. Hoppe.	Felix and Lenk, Btr. G. Mex., II, p. 215, 1899.	Basalt.	In W. T., p. 315.
4	III'' 5'' 2.4. 2.1.2.2.	Q 0.36 di 32.55 or 11.12 hy 13.27 ab 27.25 mt 6.73 an 3.89 il 2.74	Garabal Hill, n. Loch Lomond, Scotland.	Not stated.	Wyllie and Scott, G. Mag. (V), X, p. 540, 1913.	Hornblendite.	
5	(II)III.5'' 2.4. 2.3.2.4.	or 12.79 di 12.35 ab 31.96 ol 15.20 an 10.29 mt 4.18 ne 4.54 il 2.89 ap 4.70	Korsberget, n. Ulfbön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 108, 1913.	Kentallenite.	
6	III.5.2(3).4''. 2.2.2.3.	or 6.67 di 15.16 ab 34.53 hy 8.68 an 11.68 ol 11.10 mt 4.41 il 4.41 ap 0.67	Hartenrod, n. Herborn, Hesse-Nassau.	F. Heineck.	F. Heineck, N. J. B. B., XVII, p. 99, 1903.	Diabase.	
7	''III.5.2'' 4. 3.2.2.2.	or 11.12 di 19.01 ab 33.01 ol 4.62 an 11.95 mt 9.98 ne 0.85 il 0.76 hm 5.44 ap 2.35	Birkenauer Thal, Hesse.	Surv. lab.	G. Klemm, Erl. G. Kt. Hes., Bl. Birkenau, p. 26, 1905.	Diorite.	
8	III.5.2(3).'' 4. 2.2.2.2.	or 11.12 di 11.02 ab 22.01 hy 13.04 an 10.29 ol 13.61 mt 5.57 il 3.95 ap 4.37	Burg, n. Grossenritter, Hesse-Nassau.	M. Dittrich.	R. Bernges, N. J. B. B., XXXI, p. 632, 1911.	Basalt.	
9	III'' (4)5.2.4. 2.1.2.2.	Q 4.86 di 35.06 or 8.34 hy 6.22 ab 23.68 mt 12.76 an 5.28 il 2.09	Zampachn, n. Eule, Bohemia.	J. Friedrichsen.	V. Rosicky, Sb. Böhm. Ges. W., 1901, XXX, p. 29.	Schlieren in granite.	MnO high.
10	III.5.2(3).4. 2.2.3.3.	or 12.79 di 23.75 ab 25.63 ol 4.20 an 11.68 mt 6.50 ne 1.14 il 6.08 ap 6.05	Rabenstein, n. Pohorschau, Bohemia.	R. Hönig- schmidt.	Hibsch and Seeman, T. M. P. M., XXXII, p. 85, 1913.	Tephrite.	
11	III.5.2'' 4(5). 2.3.2.1.	or 6.12 di 13.61 ab 28.30 ol 16.03 an 10.56 mt 0.23 ne 2.56 il 4.56 hm 11.84 ap 3.70	Hutberg, n. Tetschen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIV, p. 110, 1894.	Augitite.	In W. T., p. 343.
12	III.5(6).2(3).4''. 2.2.2.2.	or 7.78 di 18.27 ab 27.77 ol 7.48 an 13.90 mt 9.98 ne 6.82 il 4.26 ap 1.34	Mencshely, Balaton Lake, Hungary.	K. Emszt.	J. Vitalis, Erl. Bal. Sees, I, (1), No. 2, p. 87, 1911.	Limburgite.	

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. KILAUASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13	54.53	13.06	6.85	4.86	3.14	9.83	4.62	1.59	0.52		0.96				99.96	2.687
A3. III	.909	.128	.043	.068	.078	.176	.074	.018			.012				(99.44)	
14	53.09	10.87	8.03	3.87	8.85	9.63	3.23	1.57	1.13						100.27	
A3. III	.885	.106	.050	.054	.221	.171	.051	.017								
15	49.45	13.97	8.10	11.17	1.90	5.92	5.05	1.75	1.19		trace	0.16	0.85		99.51	2.74
B2. III	.824	.137	.051	.156	.048	.105	.082	.019			—	.001	.012			
16	47.63	15.02	8.15	10.40	3.50	6.87	4.92	1.80	0.30		0.12	0.08	0.80		99.59	2.76
B2. III	.794	.147	.051	.144	.088	.123	.079	.019			.002	—	.011			
17	45.81	11.90	4.62	8.09	5.39	10.67	4.28	1.40	0.53	0.47	4.05	2.20	0.17	CO ₂ none ZrO ₂ none SO ₂ none S 0.03 Cr ₂ O ₃ none BaO 0.04 SrO trace Li ₂ O none	99.65	
A1. I	.764	.117	.029	.112	.135	.190	.069	.015			.051	.015	.002			

RANG 2. DOMALKALIC. KILAUASE.

1	56.45	13.81	1.73	3.95	8.67	6.69	5.03	0.46	2.02	0.67	0.31	0.02	trace	CO ₂ none S trace Cr ₂ O ₃ trace BaO trace SrO 0.02	99.83	
A2. II	.941	.135	.011	.055	.217	.120	.081	.005			.004	—	—			
2	50.76	14.57	4.11	10.59	2.86	7.64	5.54	1.04	0.94	(0.18)	1.60	0.06	0.09	S 0.06	99.76	
A2. II	.846	.143	.026	.147	.072	.137	.089	.011			.020	—	.001			
3	51.83	8.13	5.58	6.91	8.86	12.54	3.63	0.71	2.82						101.01	
B3. IV	.864	.080	.035	.096	.222	.224	.058	.009								
4	47.55	11.35	9.26	2.34	6.06	12.90	4.35	0.67	2.70		1.91	1.15			100.24	
A2. II	.793	.111	.058	.032	.152	.230	.070	.007			.024	.008				

RANG 3. ALKALICALCIC. CAMPTONASE. (C. I. P. W., 1902.)

1	49.71	13.30	4.41	3.37	7.96	8.03	1.49	4.81	4.07		1.57	0.66	0.17	Cr ₂ O ₃ trace BaO 0.46	100.01	
A2. II	.829	.130	.027	.048	.199	.143	.024	.051			.020	.005	.002			
2	48.36	12.42	5.25	2.48	9.36	8.65	1.46	3.97	5.54		1.18	0.84	0.13	Cr ₂ O ₃ trace BaO 0.29	99.93	
A2. II	.806	.122	.033	.035	.234	.154	.023	.042			.015	.006	.002			
3	42.31	11.40	4.07	6.11	11.31	11.02	0.82	3.69	2.72	2.28	2.00	1.44	0.11	CO ₂ trace Cr ₂ O ₃ 0.05 BaO 0.09 SrO 0.16	100.13	2.817
A1. I	.705	.112	.025	.085	.283	.196	.013	.039			.025	.010	.002			
4	55.58	12.41	0.59	6.70	10.93	7.95	1.01	2.96	0.64		0.56	trace	0.50	CO ₂ none ZrO ₂ none Cl 0.09 CoO none S none BaO 0.16 Cu none Pb none	100.08	
A1. I	.925	.122	.004	.093	.273	.142	.016	.032			.007	—	.007			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. KILAULOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	(II)III.5.2.4. 2.1.2.3.	Q 3.24 di 20.08 or 10.01 wo 5.68 ab 38.78 mt 9.98 an 10.01 il 1.82	Mount Kouragio, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Pyroxene andesite.	In W. T., p. 315.
14	III.5.2(3).4. 2.1.2.2.	Q 2.58 di 28.79 or 9.45 hy 9.26 ab 26.72 mt 11.60 an 10.56	Richmond, Cape Colony.	Kinnicut and Birney.	E. Cohen, N. J. B. B., V, p. 234, 1887.	Diabase.	In W. T., p. 315.
15	(II)III.5.2.4. 2.3.2.4.	or 10.56 di 14.80 ab 39.03 ol 9.65 an 10.01 mt 11.60 ne 2.13 ap 0.67	Crater Wall, Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 178, 1888.	Basalt.	MnO high, TiO ₂ low. In W. T., p. 315.
16	(II)III.5(6).2.4. 2.2.2.4.	or 10.56 di 17.48 ab 28.56 ol 10.03 an 13.34 mt 11.83 ne 6.96 il 0.80	Crater Wall, Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 181, 1888.	Basalt.	MnO high, TiO ₂ low. In W. T., p. 315.
17	III.5''2.4''. 2.2.3.3.	or 8.34 di 23.81 ab 29.34 ol 4.72 an 9.17 mt 6.72 ne 3.69 il 7.75 ap 5.04	Waimea Canyon, Kauai, Hawaiian Islands.	W. T. Schaller.	W. Cross, U. S. G. S. P. P. 88, p. 15, 1915.	Kauiite (gabbro).	

SUBRANG 5. PERSODIC.

1	(II)III.5.2(3).5. 1.1.2.2.	or 2.78 di 15.69 ab 42.44 hy 19.53 an 13.62 mt 2.55 il 0.61	Brush Creek, Port Orford quadrangle, Oregon.	H. N. Stokes.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Gabbro.	
2	(II)III.5''2.(4)5. 2.2.2.4.	or 6.12 di 22.06 ab 37.73 ol 7.10 an 11.95 mt 6.03 ne 4.26 il 3.04	Pahtosvaara, Kiruna District, Finland.	G. Nyblom.	H. Lundbohm, G. F. F., XXXII, p. 787, 1910.	Soda greenstone.	
3	III(IV).5.2.(4)5. 2.1.3.2.	or 4.45 di 46.80 ab 28.30 ol 5.62 an 3.89 mt 8.12 ne 1.14	Malinka Sosnowka, Koswinsky, N. Ural Moun- tains, Russia.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 189, 1902.	Diabase.	
4	III.5''2''5. 2.1.3.2.	or 3.89 di 32.83 ab 29.08 wo 1.97 an 9.45 mt 1.86 ne 4.12 il 3.65 hm 8.00 ap 2.69	Pou-tche-ho, East Yunnan, China.	Pisani.	J. Deprat, Mem. Sv. G. Indoch., I (1), 1, p. 230, 1912.	Diabase.	

SUBRANG 2. DOPOTASSIC. ABSAROKOSE. (C. I. P. W., 1902.)

1	''III.5''3.2''. 2.1.2.2.	or 28.36 di 16.01 ab 12.58 hy 11.46 an 15.29 ol 0.98 mt 6.26 il 3.04 ap 1.68	Cache Creek, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 938, 1895.	Absarokite.	Not fresh. Also in U. S. G. S. Mon. 32 (II), p. 329, 1899. In W. T., p. 315.
2	III.5.3.2(3). 2.1.2.2.	or 23.35 di 17.06 ab 12.05 hy 13.30 an 15.85 ol 1.54 mt 5.10 il 2.28 hm 1.76 ap 2.02	Clarks Fork River, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 938, 1895.	Absarokite.	Not fresh. Also in U. S. G. S. Mon. 32, (II), p. 329, 1899. In W. T., p. 315.
3	III.5''3.2. 2.3.2.2.	or 21.68 di 23.49 ab 0.52 ol 15.71 an 16.98 mt 5.80 ne 3.41 il 3.80 ap 3.36	Rossland, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (II), p. 368, 1912.	Missourite.	
4	III''5.3(4).2''. 1.1.2.2.	Q 3.60 di 15.23 or 17.79 hy 31.70 ab 8.38 mt 0.93 an 20.57 il 1.06	Pigeon Island, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Gui., p. 77, 1908.	Syenite.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	50.82	11.44	0.25	8.94	14.01	8.14	1.79	3.45	0.58		0.59	0.20	0.19	Cr ₂ O ₃ 0.08 NiO trace BaO 0.06	100.49	
A2. II	.847	.112	.002	.124	.350	.145	.029	.037			.007	.001	.003			
2	51.76	12.36	4.88	4.60	9.57	7.14	1.99	3.83	3.05		0.47	0.56	0.11		100.32	
A2. II	.883	.121	.030	.064	.239	.127	.032	.040			.006	.004	.002			
3	51.68	14.07	4.71	4.57	7.72	6.65	2.45	4.16	2.09		1.08	0.72	trace	SO ₃ 0.13 Li ₂ O trace	100.03	
A2. II	.861	.138	.029	.064	.193	.119	.040	.045			.013	.005	—			
4	50.59	11.53	1.83	7.64	11.27	8.79	2.27	2.33	1.76	0.21	0.80	0.48	0.17	SO ₃ none Cl trace NiO 0.06 BaO 0.10 SrO 0.03	99.86	
A1. I	.843	.112	.011	.106	.282	.157	.037	.025			.010	.003	.002			
5	48.95	12.98	3.63	4.68	11.73	7.66	2.31	3.96	3.16		0.49	0.67	0.13		100.35	
A2. II	.816	.127	.023	.065	.293	.137	.037	.042			.006	.005	.002			
6	42.95	12.44	10.16	5.18	5.82	13.11	2.10	2.29	1.98	0.91	1.34	1.37	0.29	SO ₃ 0.15 Cl 0.07 S none BaO none	100.16	
A1. I	.716	.122	.064	.072	.146	.234	.034	.024			.017	.010	.004			
7	43.49	12.76	5.92	5.18	9.23	10.54	2.40	2.53	3.05	1.86	2.10	0.75	0.10	CO ₂ 0.25 S 0.11 BaO 0.13 SrO 0.12	100.52	
A1. I	.725	.125	.037	.072	.231	.188	.039	.027			.026	.005	.001			
8	54.09	15.02	4.12	5.15	7.28	7.72	1.99	3.55	1.49						100.37	
B3. IV	.902	.147	.025	.072	.182	.137	.032	.038								
9	52.09	11.93	1.84	7.11	12.48	7.84	2.04	3.01	0.35		0.73	0.34	0.15	CO ₂ 0.16 Cr ₂ O ₃ 0.10 NiO 0.07	100.24	
A2. II	.868	.117	.012	.099	.312	.140	.033	.032			.009	.002	.002			
10	55.57	14.37	1.66	7.08	8.27	4.94	29.0	2.96	1.58		1.00	0.31	0.20		99.84	
A2. II	.926	.141	.010	.099	.207	.088	.047	.032			.002	.002	.003			
11	47.39	13.39	3.25	5.12	12.34	9.73	1.86	2.56	3.01		0.75	0.24	0.15	CO ₂ 0.22	100.01	
A2. II	.790	.131	.020	.071	.309	.173	.030	.028			.009	.002	.002			
12	54.50	13.67	0.63	11.44	3.25	6.41	2.97	3.07	0.13	0.15	2.18	0.46	0.21	Cl 0.12M S 0.25	99.60	
A2. II	.908	.134	.004	.159	.081	.114	.048	.033			.027	.003	.003			
13	43.79	14.65	11.78	7.65	2.99	10.16	2.53	2.65	0.88		1.49	0.79	0.42	SO ₃ 0.05 Cl 0.03 CuO trace	99.86	
A2. II	.730	.144	.074	.107	.075	.181	.040	.029			.019	.006	.006			
14	45.26	15.70	2.44	6.16	8.28	11.95	1.73	3.42	1.12	0.29	1.66	0.90	0.34	ZrO ₂ 0.01 Cl 0.25 F 0.08 S 0.05 Cr ₂ O ₃ none BaO 0.10 SrO 0.06	99.80	
A1. I	.754	.154	.015	.086	.207	.214	.027	.036			.021	.006	.005			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 3. SODIPIOTASSIC. KENTALLENSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III.5.3.3. 1.1.2.2.	or 20.57 di 21.51 ab 12.58 ol 23.05 an 12.79 mt 0.46 ne 1.42 il 1.06 ap 0.34	Bet. South Boulder and Antelope creeks, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 670, 1895.	Lampro- phyre.	In W. T., p. 317.
2	III.5.3.3. 2.1.2.2.	or 22.24 di 14.26 ab 16.79 ol 21.14 an 13.62 mt 6.96 il 0.91 ap 1.34	Raven Creek, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 938, 1895.	Absarokite.	Also in U. S. G. S. Mon. 32, (II), p. 329, 1899. In W. T., p. 315.
3	(II)III.5.(2)3.3. 2.1.2.2.	or 25.02 di 10.74 ab 20.96 hy 13.22 an 14.73 ol 2.79 mt 6.73 il 1.98 ap 1.68	Two Ocean Pass, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32 (2), p. 329, 1899.	Absarokite.	In W. T., p. 317.
4	III.5.3.3(4). 1.2.2.2.	or 13.90 di 21.69 ab 19.39 hy 8.74 an 13.90 ol 14.88 mt 2.55 il 1.52 ap 1.01	Indian Creek Laccolith, Yellowstone National Park.	W. F. Hille- brand.	J. P. Iddings, U. S. G. S. Mon. 32 (2), p. 83, 1899.	Andesite- porphyry.	Lower part of sheet. Cf. No. 18. II.5.2.3. In W. T., p. 317.
5	III.5.(2)3.3. 2.3.2.2.	or 23.35 di 15.81 ab 15.72 ol 19.09 an 13.34 mt 5.34 ne 1.99 il 0.91 ap 1.68	Lamar River, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 938, 1895.	Absarokite.	Also in U. S. G. S. Mon. 32 (II), p. 329, 1899. In W. T., p. 313.
6	III.5.3.3''. 3.1.3.2.	or 13.34 di 29.59 ab 14.15 ol 0.63 an 17.79 mt 11.37 ne 1.99 il 2.58 hm 2.40 ap 3.34	Mineral Hill, Sundance quadrangle, Wyoming.	G. Steiger.	W. S. T. Smith, U. S. G. S. Fol. 127, p. 7, 1905.	Augite vagesite.	
7	III.5(6).3.3''. 2.2.2.2.	or 15.01 di 24.32 ab 9.96 ol 9.22 an 16.40 mt 8.58 ne 5.68 il 3.95 ap 1.68	Near Mica Butte, Apishapa quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. P. P. 90, p. 25, 1914.	Hornblende vagesite.	Not fresh.
8	(II)III.5.3.3. 2.1.2.2.	Q. 2.34 di 13.28 or 21.13 hy 18.08 ab 16.77 mt 5.80 an 21.41	Beinn an Fhurain, Inchnadamph, Assynt, Scotland.	J. J. H. Teall.	J. J. H. Teall, G. Mag., XXIII, p. 350, 1886.	Diorite porphyry.	In W. T., p. 317.
9	III.5.3.3.⊙ 1.2.2.2.	or 17.79 di 18.04 ab 17.29 hy 12.04 an 14.46 ol 15.14 mt 2.78 il 1.37 ap 0.67	Allt an Sithein, Glen Shira, Argyll, Scotland.	W. Pollard.	Hill and Kynaston, Q. J. G. S., LVI, p. 537, 1900.	Kentallenite.	In W. T., p. 317.
10	(II)III.5.3.3''. 2.1.1.2.	Q. 1.32 di 4.26 or 17.79 hy 29.20 ab 24.63 mt 2.32 an 17.24 il 1.82 ap 0.67	Vallo, Lower Tornea, Finland.	N. Sahlbom.	V. Hackmann, B. C. G. Fin., No. 15, p. 56, 1905.	Quartz gabbro.	
11	III.5.3.3.⊙ 2.3.2.2.	or 15.57 di 20.47 ab 13.10 ol 19.22 an 20.29 mt 4.64 ne 1.42 il 1.37 ap 0.67	Reichenau, n. Königsbrück, Lausitz.	P. J. Beger.	P. J. Beger, Vh. Sächs. Ges. W., LXV, p. 376, 1913.	Kersantite.	
12	(II)III.5.(2)3.3''. 2.1.2.2.	Q. 3.12 di 12.01 or 18.35 hy 19.30 ab 25.15 mt 0.93 an 14.73 il 4.10 ap 1.01	Goroschnia, Wohynia, Russia.	W. Tarassenko.	W. Tarassenko, Ref. N. J., 1899, I, p. 463.	Pyroxene syenite.	In W. T., p. 317.
13	III.5.3.3''. 3.1.2.3.	or 16.12 di 18.96 ab 19.39 ol 0.69 an 20.85 mt 17.17 ne 0.88 il 2.89 ap 2.02	Namtagira, Lake Kivu Dis- trict, German East Africa.	O. Hauser.	L. Finckh, D. Zent. Afr. Exp., I, (1), p. 19, 1912.	Leucite theralite.	
14	III.5(6).3.3.3. 2.2.2.2.	or 20.02 di 22.92 ab 2.10 ol 12.22 an 25.30 mt 3.48 ne 6.53 il 3.19 ap 2.02	Gentungen River, Maros District, Celebes.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 627, 1913.	Biotite kentallen- ite.	Also in Iddings and Morley, J. G., XXIII, p. 240, 1915.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
15	46.54	15.95	5.24	5.51	4.70	10.69	2.28	4.44	0.52	0.59	1.11	1.18	0.18	ZrO ₂ 0.01 Cl 0.07 F 0.06 S 0.09 Cr ₂ O ₃ none BaO 0.13 SrO 0.24	99.53	
A1. I	.776	.156	.033	.076	.118	.191	.037	.047			.014	.008	.003			
16	51.68	14.77	1.26	10.70	4.67	8.37	2.61	2.52	0.13	0.01	2.91	0.26	0.33	SO ₃ none Cl 0.12 Li ₂ O none	100.34	
A2. II	.861	.145	.008	.149	.117	.150	.042	.027			.036	.002	.005			
17	43.58	11.46	3.40	9.13	10.80	9.88	2.18	2.13	2.40	0.47	3.32	0.95	trace	SO ₃ none Cl trace Li ₂ O none	99.70	2.978
A2. II	.726	.112	.021	.126	.270	.177	.035	.022			.042	.007	—			
18	43.06	13.06	4.68	8.10	9.92	9.30	2.14	2.14	2.53	0.76	3.60	0.96	0.43	CO ₂ trace SO ₃ none Cl trace Li ₂ O none	100.68	2.935
A2. II	.718	.128	.029	.113	.248	.166	.034	.023			.045	.007	.006			
19	47.20	11.78	1.94	9.04	9.95	11.63	1.61	1.67	1.24	0.28	4.31	trace	0.26	CO ₂ 0.17 NiO 0.03 BaO none SrO none	101.11	
B2. III	.787	.116	.012	.125	.249	.207	.026	.018			.054		.004			

RANG 3. ALKALICALCIC. CAMPTONASE.

1	46.61	15.34	8.40	8.14	5.27	9.27	3.04	1.41	1.41		0.55		0.39		99.83	
A2. II	.777	.150	.052	.113	.132	.166	.049	.015			.007		.006			
2	51.41	14.13	3.48	9.25	5.54	6.40	3.43	1.80	1.98	0.12	1.20	0.06	0.30		99.10	
B2. III	.857	.138	.022	.129	.139	.114	.055	.019			.015	—	.004			
3	50.76	13.90	4.13	10.28	4.73	8.14	2.82	0.85	1.57	0.23	1.50	0.07	0.34	NiO none	99.32	
B2. III	.846	.136	.026	.143	.118	.145	.045	.009			.019	—	.005			
4	50.12	15.70	1.42	6.89	9.50	11.30	2.91	1.07	1.03	0.21	0.55			S. BaO 0.14 none	100.84	
A2. II	.835	.154	.009	.096	.235	.202	.047	.012			.007					
5	43.94	16.17	3.96	10.06	5.05	9.59	2.93	1.51	1.42	0.13	4.13	0.69	trace	CO ₂ 0.09 BaO none	99.67	
A2. II	.732	.159	.025	.140	.126	.171	.047	.016			.052	.005	—			
6	47.12	14.43	3.33	11.71	6.05	9.63	2.58	1.11	0.34	0.28	3.27				99.85	3.072
A2. II	.785	.142	.021	.163	.151	.172	.042	.012			.041					
7	52.37	15.06	2.34	9.82	5.38	7.33	4.04	0.92	2.24		0.21		0.32		100.03	
A2. II	.873	.147	.015	.137	.135	.130	.065	.010			.003		.005			
8	50.57	13.58	3.26	10.09	4.98	7.67	2.92	1.89	0.16	0.94	2.68	0.28	0.36	Cl 0.09 F 0.09 S 0.03 BaO 0.09 SrO 0.10	99.78	
A1. I	.843	.133	.020	.140	.125	.120	.047	.020			.034	.002	.005			
9	46.40	14.17	2.03	13.12	4.94	9.65	3.14	1.12	0.02	0.25	3.03	0.80	0.44	ZrO ₂ 0.05 Cl 0.15 F 0.04 S 0.14 BaO 0.18 SrO 0.10	99.77	
A1. I	.773	.139	.013	.182	.124	.172	.051	.012			.038	.006	.006			
10	47.16	14.45	1.61	13.81	5.24	8.13	3.09	1.20	0.48	0.12	3.37	0.57	0.24	CO ₂ 0.35 S 0.14 Cr ₂ O ₃ trace NiO 0.02 BaO trace SrO trace	99.98	
A1. I	.786	.142	.010	.192	.131	.144	.050	.013			.042	.004	.003			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 3. SODI POTASSIC. KENTALLENSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
15	(II)III.5(6).3.3. 2.2.2.3.	or 26.13 di 20.94 ab 7.86 ol 4.29 an 20.02 mt 7.66 ne 6.25 il 2.13 ap 2.09	Gillinan River, n. Masin, Mount Mouriah, Java.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Leucito- phyre.	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.
16	III.5.3.3(4). 2.1.2.3.	Q. 0.06 di 15.38 or 15.01 hy 18.50 ab 22.01 mt 1.86 an 21.13 il 5.47 ap 0.67	Meredith, Victoria.	Not stated.	A. R. Secy. Mines Vict., (1910), p. 64, 1911.	Tachylite.	
17	III.5''3.3(4). 2.3.2.2.	or 12.23 di 21.99 ab 13.10 ol 17.79 an 15.29 mt 4.87 ne 2.84 il 6.38 ap 2.35	Woodend, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, Vict. G. S. B. 24, p. 28, 1912.	Limburgite.	
18	III.5.3.3(4). 2.3.2.2''.	or 12.79 di 15.90 ab 15.20 ol 16.56 an 19.74 mt 6.73 ne 1.42 il 6.84 ap 2.35	Kings Quarry, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, Vict. G. S. B. 24, p. 28, 1912.	Limburgite.	
19	III.5.3(4).3''. 2.2.2.2.	or 10.01 di 30.06 ab 13.62 hy 4.16 an 20.02 ol 10.73 mt 2.78 il 8.21	Dingo Creek, Nandewar Moun- tains, New South Wales.	H. I. Jenson.	H. I. Jenson, Pr. Linn. Soc. N. S. W., XXXII, p. 904, 1908.	Dolerite.	

SUBBRANG 4. DOSODIC. CAMPTONOSE. (C. I. P. W., 1902.)

1	III.5.3''4. 2.2.2.3.	or 8.34 di 18.08 ab 25.88 ol 8.96 an 23.91 mt 12.06 il 1.06	Coldbrook Marsh, St. John, New Brunswick.	W. D. Matthew.	W. D. Matthew, Tr. N. Y. Ac. Sci., XIV, p. 214, 1895.	Quartz diabase.	In W. T., p. 273.
2	III.5.3.4. 2.1.2.3.	or 10.56 di 11.44 ab 28.82 hy 20.93 an 17.79 mt 5.10 il 2.28	Wapus Creek, Gowganda Dis- trict, Ontario.	M. F. Connor.	W. H. Collins, Can. G. S. Mem. 33, p. 76, 1913.	Quartz diabase.	
3	III.5.3(4).4''. 2.1.2.3.	Q. 4.44 di 14.54 or 5.00 hy 18.17 ab 23.58 mt 6.03 an 22.90 il 2.89	Rankin Township, Gowganda Dis- trict, Ontario.	M. F. Connor.	W. H. Collins, Can. G. S. Mem. 33, p. 76, 1913.	Diabase.	
4	III.5.3(4).4 1.3.2.2.	or 6.67 di 23.97 ab 19.91 ol 17.65 an 26.41 mt 2.07 ne 2.56 il 1.06	O'Brien Mine, Cobalt, Ontario.	N. L. Bowen.	N. L. Bowen, J. Can. Ming. Inst., XII (1909), p. 519, 1910.	Diabase.	Also in J. G., XVIII, p. 661, 1910.
5	(II)III.5.3(4).4. 3.3.2.3.	or 8.90 di 13.14 ab 22.01 ol 10.58 an 26.69 mt 5.80 ne 1.42 il 7.90 ap 1.68	Lockes Hill, Belknap Moun- tains, New Hampshire	H. S. Washing- ton.	H. S. Washington, A. J. S., XXII, p. 495, 1906.	Essexite (horn- blende gabbro).	In W. T., p. 319.
6	III.5.3(4).4. 2.2.2.3.	or 6.67 di 19.23 ab 22.01 hy 7.46 an 24.46 ol 8.42 mt 4.87 il 6.23	Rockport, Cape Ann, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VII, p. 289, 1899.	Diabase.	In W. T., p. 319.
7	(II)III.5.3.4(5). 1.2.2.3.	or 5.56 di 13.43 ab 34.06 hy 14.42 an 20.02 ol 6.47 mt 3.48 il 0.46	Middlefield, Connecticut.	J. H. Pratt.	H. E. Gregory, U. S. G. S. B. 165, p. 176, 1900.	Diabase.	In W. T., pp. 317, 319.
8	III.5.3.4⊙. 2.1.2.3.	Q. 2.76 di 10.79 or 11.12 hy 19.17 ab 24.63 mt 4.64 an 18.35 il 5.17 ap 0.67	Heath Mountain, Warren County, New York.	E. W. Morley.	W. J. Miller, J. G., XXI, p. 174, 1913.	Diabase.	
9	III.5.3.4⊙ 2.3.2.3.	or 6.67 di 17.70 ab 26.72 ol 16.05 an 21.13 mt 3.02 il 5.73 ap 2.02	North Creek, Warren County, New York.	E. W. Morley.	W. J. Miller, J. G., XXI, p. 170, 1913.	Hornblende norite.	
10	III.5.3.4⊙ 2.3.2.3.	or 5.23 di 12.09 ab 26.20 hy 8.18 an 21.96 ol 13.07 mt 2.32 il 6.38 ap 1.34	Elizabethtown, Essex County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. B. 168, p. 37, 1900.	Norite.	In W. T., p. 319.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
11	46.74	16.63	2.17	10.60	6.11	8.66	3.81	0.86	0.73	0.12	2.54	0.33	0.26	CO ₂ 0.07 S 0.11 Cr ₂ O ₃ trace NiO 0.03 BaO trace SrO trace	99.77	
A1. I	.779	.163	.014	.147	.153	.154	.061	.009			.030	.002	.004			
12	44.77	12.46	4.63	12.99	5.34	10.20	2.47	0.95	0.48	0.12	5.26	0.28	0.17	CO ₂ 0.37 S 0.26 NiO trace BaO trace	100.75	3.090
A2. II	.736	.122	.029	.180	.134	.182	.040	.010			.064	.002	.002			
13	51.82	14.18	0.57	9.07	8.39	8.60	2.79	1.26	1.40	0.30	1.17	0.17	0.13		99.85	2.95
A2. II	.864	.139	.004	.123	.210	.154	.045	.014			.015	.001	.002			
14	51.34	12.71	2.65	14.14	3.66	7.44	2.43	1.44	0.69	0.18	3.47	0.20	0.36		100.71	3.089
A2. II	.856	.125	.016	.196	.092	.133	.039	.015			.043	.002	.005			
15	50.34	15.23	2.82	11.17	5.81	9.61	2.93	1.02	0.07	0.19	1.56	0.20	0.14		101.09	2.968
B2. III	.839	.149	.018	.155	.145	.172	.047	.011			.020	.001	.002			
16	49.68	14.02	4.97	9.52	5.80	6.50	3.49	1.41	1.89	0.54	1.39	0.21	0.18	SrO trace	99.60	2.949
A2. II	.828	.137	.031	.132	.145	.116	.056	.015			.017	.002	.003			
17	51.08	16.45	0.84	10.08	6.95	5.57	3.49	1.28	0.51	0.08	4.44	0.14	0.08	CO ₂ trace S trace	100.99	2.977
A2. II	.851	.161	.005	.140	.174	.100	.056	.014			.056	.001	.001			
18	48.11	14.74	2.54	11.85	5.10	6.72	2.92	1.92	1.73	0.27	3.17	0.44	0.19	FeS ₂ 0.13 Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.03 NiO 0.03 BaO 0.04 SrO 0.02	99.96	
A1. I	.802	.144	.015	.165	.128	.120	.047	.020			.039	.003	.003			
19	50.07	12.63	3.84	10.30	5.23	6.55	3.53	1.90	1.96	0.86	2.50	0.22	0.42	CO ₂ none ZrO ₂ none SO ₃ none S none BaO 0.02 SrO none	100.03	
A1. I	.835	.124	.024	.143	.131	.117	.056	.020			.031	.002	.006			
20	52.34	14.17	2.40	10.78	3.51	7.25	3.73	2.37	0.43	0.18	2.21	0.80	0.09	S 0.14	100.40	
A2. II	.872	.139	.015	.150	.088	.130	.060	.026			.028	.006	.001			
21	48.45	12.70	2.00	13.24	4.39	8.50	3.94	1.22	1.58	none	3.17	0.72	0.17	CO ₂ none Cr ₂ O ₃ 0.10	100.18	2.90
A2. II	.808	.125	.013	.184	.110	.152	.064	.013			.040	.005	.00			
22	45.65	15.20	6.71	13.81	2.95	6.33	3.09	1.05	2.29		1.66	0.25	0.71	BaO none SrO none	99.70	2.85
A2. II	.761	.149	.042	.102	.074	.112	.050	.011			.021	.002	.010			
23	51.14	13.95	2.15	12.97	2.21	6.56	3.59	2.33	0.22	0.12	2.41	1.59	0.44	ZrO ₂ 0.12 Cl trace F 0.10 FeS ₂ 0.15 NiO trace BaO 0.25 SrO trace V ₂ O ₅ trace	100.30	2.907
A1. I	.852	.137	.013	.161	.055	.117	.058	.024			.030	.011	.006			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
11	(II)III.5.3.4(5). 2.3.2.3.	or 5.00 di 13.08 ab 27.25 ol 16.86 an 25.02 mt 3.25 ne 2.56 il 4.56 ap 0.67	Elizabethtown, Essex County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. B. 168, p. 37, 1900.	Norite.	Gneissoid form of No. 19, III.5.4.4-5. In W. T., p. 319.
12	III.5.3''4. 2.2.2.3.	or 5.56 di 24.02 ab 20.96 hy 6.07 an 19.46 ol 5.31 mt 6.73 il 9.73 ap 0.67	Lincoln Pond, Essex County, New York.	G. Steiger.	J. F. Kemp, U. S. G. S. A. R. 19, III, p. 407, 1899.	Gabbro.	In W. T., p. 319.
13	III.5.3''4. 1.2.2.3.	or 7.78 di 16.11 ab 23.58 hy 18.66 an 22.24 ol 6.46 mt 0.93 il 2.28 ap 0.34	Scotch Plains, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 159, 1908.	Basalt.	Lower layer. Cf. No. 22, III.5.4.5.
14	III.'5.3''4. 2.1.2.4.	Q 6.00 di 13.19 or 8.34 hy 21.26 ab 20.44 mt 3.71 an 19.74 il 6.74 ap 0.67	Jersey City, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 121, 1908.	Quartz diabase.	Also in A. J. S. XXVI, p. 158, 1908.
15	III.5.3(4).4. 2.2.2.3.	or 6.12 di 17.97 ab 24.63 hy 13.63 an 25.30 ol 5.75 mt 4.18 il 3.04 ap 0.34	Rocky Hill, New Jersey.	A. H. Phillips.	A. H. Phillips, A. J. S., VIII, p. 279, 1899.	Dolerite.	In W. T., p. 319.
16	''III.5.3.4. 2.1.2.3.	or 8.34 di 9.80 ab 29.34 hy 20.08 an 13.35 ol 0.79 mt 7.19 il 2.58 ap 0.67	Millington, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 159, 1908.	Basalt.	
17	(II)III.5.3''4. 2.1''1.3.	or 7.78 di 1.36 ab 29.34 hy 24.87 an 25.30 ol 1.76 mt 1.16 il 8.51 ap 0.34	Roseland, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 95, 1913.	Gabbro.	
18	''III.5.3.4. 2.2.2.3.	or 11.12 di 7.64 ab 24.63 hy 17.37 an 21.41 ol 4.92 mt 3.48 il 5.93 ap 1.01	Near Limestone Cove, Unicoi County, Tennessee.	W. F. Hille- brand.	A. Keith, U. S. G. S. B. 168, p. 59, 1900.	Gabbro.	In W. T., p. 319.
19	III.5.(2)3.4. 2.1.2.3.	or 11.12 di 14.47 ab 29.34 hy 17.28 an 13.34 ol 0.76 mt 5.57 il 4.71 ap 0.60	Eagle River* Section, Keweenaw Point, Michigan.	G. Steiger.	A. N. Winchell, J. G., XVI, p. 772, 1908.	Diabase.	
20	(II)III.5.(2)3.4. 2.1.2.2.	or 14.46 di 13.21 ab 31.44 hy 15.70 an 14.73 ol 0.51 mt 3.48 il 4.26 ap 2.02	Richmond, Minnesota.	E. M. Pennock.	F. F. Grout, J. G., XVIII, p. 656, 1910.	Gabbro.	
21	III.5.(2)3.4. 2.2.2.2.	or 7.22 di 20.29 ab 33.64 hy 1.66 an 13.34 ol 12.64 mt 3.02 il 6.08 ap 1.68	Stearns County, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 655, 1910.	Diabase.	
22	''III.5.3''4''. 2.1.1.2.	or 6.12 di 4.02 ab 26.20 hy 21.05 an 24.46 ol 1.99 mt 9.74 il 3.19 ap 0.67	Duluth, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 293, 1900.	Orthoclase gabbro.	In W. T., p. 319.
23	(II)III.5.(2)3.4. 2.1.2.4.	Q 1.56 di 5.98 or 13.34 hy 21.43 ab 30.39 mt 3.02 an 15.29 il 4.56 ap 3.70	Cinder Butte, Snake River Plains, Idaho.	W. F. Hille- brand.	I. C. Russell, U. S. B. S. B. 199, p. 87, 1902.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
24	49.22	12.02	2.77	8.80	9.29	10.56	1.90	1.70	1.63	0.27	0.95	0.43	trace	SO ₃ 0.04 Cl 0.08 S 0.05 BaO 0.03 SrO 0.03	99.77	
A1. I	.820	.118	.017	.122	.232	.189	.021	.018			.012	.003	—			
25	53.56	16.07	3.21	5.29	7.23	8.77	3.06	1.94	0.19	0.68	0.18	0.11			100.29	
A2. II	.893	.158	.020	.073	.181	.157	.049	.021		.008	.001	.002				
26	51.81	15.24	3.66	4.86	8.89	9.06	2.83	2.08	0.67		0.77	0.18	0.08		100.13	
A2. II	.864	.149	.023	.068	.222	.162	.045	.022			.010	.001	.001			
27	51.70	15.18	2.09	8.54	8.18	8.73	2.31	1.81	0.16		1.24	0.21	trace	Cl S trace 0.09	100.24	
A2. II	.862	.149	.013	.119	.205	.155	.037	.020			.014	.001	—			
28	47.28	11.56	3.52	5.71	13.17	9.20	2.73	2.17	2.96		0.88	0.59	0.13	Cl 0.18	100.08	
A2. II	.788	.113	.022	.079	.329	.164	.043	.023			.011	.004	.002			
29	53.27	15.43	2.43	6.50	6.16	8.18	3.51	1.71	0.62	none	1.30	0.50	0.12	CO ₂ none	99.73	
A2. II	.888	.151	.015	.090	.154	.146	.056	.018			.016	.004	.002			
30	49.73	15.46	3.32	8.14	7.20	9.63	3.30	0.87	0.32	0.16	1.59	0.42	0.13	CO ₂ none	100.27	
A2. II	.829	.152	.021	.113	.180	.171	.053	.009			.020	.003	.002			
31	48.35	15.47	4.80	7.58	8.15	8.81	3.09	0.95	0.73	0.28	1.33	0.33	0.21	ZrO ₂ none SO ₃ 0.07 S trace Cr ₂ O ₃ trace NiO 0.02 BaO 0.06 SrO 0.03 Li ₂ O trace	100.26	2.970
A1. I	.806	.152	.030	.106	.204	.157	.050	.010			.015	.002	.003			
32	49.36	16.35	2.93	8.55	7.06	10.08	2.67	0.82	0.65	0.22	0.98	0.30	0.19	NiO 0.05 BaO 0.04 SrO none Li ₂ O none	100.25	
A2. II	.823	.160	.018	.119	.177	.180	.043	.009			.012	.002	.003			
33	45.30	14.95	1.98	9.32	8.29	8.87	4.27	1.27	0.85		2.66	2.23	trace		99.99	
A2. II	.755	.147	.012	.129	.207	.159	.069	.013			.032	.015	—			
34	54.64	12.09	1.81	5.03	11.86	7.74	2.35	1.01	2.44	0.12	0.61	trace	0.13	CO ₂ none NiO 0.05 BaO 0.05 SrO trace Li ₂ O trace	100.01	
A2. II	.911	.119	.011	.070	.297	.138	.038	.011			.008	—	.002			
35	50.66	13.97	2.55	10.20	4.45	8.08	3.32	1.95	0.43	0.27	2.39	1.01	0.29	Cl 0.02 NiO trace BaO 0.22 SrO trace Li ₂ O none	99.81	
A2. II	.844	.137	.016	.141	.111	.144	.053	.021			.030	.007	.004			
36	54.56	16.04	0.95	6.07	8.71	8.89	3.05	1.18	0.28		0.53	0.18	0.17	Cr ₂ O ₃ trace BaO 0.03 SrO trace Li ₂ O trace	100.38	
A2. II	.909	.157	.006	.085	.218	.159	.049	.013			.007	.001	.002			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
24	III.5.3''.(3)4. 2.2.2.2.	or 10.01 di 24.53 ab 15.72 hy 14.42 an 19.46 ol 6.95 mt 3.94 il 1.82 ap 1.01	Red Mountains, Montana.	H. N. Stokes.	H. W. Weed, J. G., VII, p. 739, 1899.	Gabbro.	In W. T., p. 317.
25	(II)III.5.3.4. 2.1.2.2.	Q 0.24 di 14.52 or 11.68 hy 17.32 ab 25.68 mt 4.64 an 24.46 il 1.22 ap 0.34	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 260, 1899.	Gabbro- porphyry.	In W. T., p. 319.
26	''III.5.3''4. 2.2.2.2.	or 12.23 di 16.92 ab 23.58 hy 11.72 an 22.80 ol 4.60 mt 5.34 il 1.52 ap 0.34	Hurricane Ridge, Crandall Basin, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, U. S. G. S. Mon. 32 (II), p. 260, 1899.	Gabbro- porphyry.	In W. T., p. 319.
27	III.5.3(4).(3)4. 1.1.2.2.	or 11.12 di 13.57 ab 19.39 hy 20.12 an 25.58 ol 4.29 mt 3.02 il 2.13 ap 0.34	Dunraven Peak, Yellowstone National Park.	F. A. Gooch.	J. P. Iddings, U. S. G. S. B. 148, p. 135, 1897.	Basalt.	In W. T., p. 319.
28	III.5''3.(3)4. 2.3.2.2.	or 12.79 di 17.82 ab 14.93 ol 21.92 an 19.46 mt 5.10 ne 4.12 il 1.67 ap 1.34	Ishawooa Canyon, Wyoming.	J. P. Whitfield.	A. Hague, A. J. S., XXXVIII, p. 46, 1889.	Leucite phonolite.	Leucite absarokite in Iddings, J. G., III, p. 938, 1895. In W. T., p. 321.
29	(II)III.5.3.4. 2.1.2.2.	Q 1.14 di 12.61 or 10.01 hy 17.34 ab 29.34 mt 3.48 an 21.41 il 2.43 ap 1.34	Folsom, Colfax County, New Mexico.	G. Steiger.	J. B. Mertie, U. S. G. S. rec. lab.	Basalt.	
30	''III.5.3''4(5). 2.2.2.3.	or 5.00 di 16.01 ab 27.77 hy 9.50 an 25.02 ol 7.62 mt 4.87 il 3.04 ap 1.01	Barella Mesa, Colfax County, New Mexico.	G. Steiger.	J. B. Mertie, U. S. G. S. rec. lab.	Basalt.	
31	''III.5.3(4).4''. 2.2.2.2.	or 5.56 di 12.98 ab 26.20 hy 8.84 an 25.58 ol 9.92 mt 6.96 il 2.28 ap 0.67	San Rafael Flow, Colfax County, New Mexico.	W. F. Hillebrand.	W. Cross, U. S. G. S. B. 168, p. 171, 1900.	Basalt.	In W. T., p. 321.
32	''III.5.3(4).4''. 2.2.2.3.	or 5.00 di 14.74 ab 22.53 hy 13.98 an 30.02 ol 6.32 mt 4.18 il 1.82 ap 0.67	Santa Maria Basin, Arizona.	W. F. Hillebrand.	J. P. Iddings, U. S. G. S. B. 148, p. 187, 1897.	Mica basalt.	In W. T., p. 333.
33	''III.5(6).3.4. 2.4.2.3.	or 7.23 di 7.66 ab 25.15 ol 20.46 an 20.85 mt 2.78 ne 5.96 il 4.86 ap 5.04	Near Mount Trumbull, Arizona.	L. G. Eakins.	U. S. G. S. B. 148, p. 188, 1897.	Lava (basalt?).	In W. T., p. 321.
34	III.5.3''4. 1.1.2.2.	Q 3.54 di 15.01 or 6.12 hy 29.58 ab 19.91 mt 2.55 an 19.46 il 1.22	Near Table Mountain, Butte County, California.	W. F. Hillebrand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 731, 1896.	Quartz diorite.	In W. T., p. 321.
35	''III.5.3.4. 2.1.2.3.	Q 0.36 di 13.39 or 11.68 hy 17.59 ab 27.77 mt 3.71 an 17.51 il 4.56 ap 2.35	Oroville, Table Mountain, Butte County, California.	W. F. Hillebrand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 491, 1894.	Basalt.	In W. T., p. 321.
36	''III.5.3(4).4. 1.1.2.2.	or 7.23 di 13.69 ab 25.68 hy 23.66 an 26.41 ol 0.94 mt 1.39 il 1.06 ap 0.34	Near Cinder Cone, Lassen Peak, California.	W. F. Hillebrand.	J. S. Diller, U. S. G. S. B. 79, p. 29, 1891.	Quartz basalt.	In W. T., p. 321.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
37	53.46	14.81	2.60	5.15	7.27	8.44	2.60	1.30	2.13	0.12	0.70	0.16	0.18	CO ₂ 0.44 FeS ₂ 0.26 NiO 0.05 BaO 0.05 SrO trace Li ₂ O trace	99.76	
A1. I	.891	.145	.016	.072	.182	.150	.042	.014			.009	.001	.003			
38	51.27	12.14	2.51	6.71	10.88	10.32	2.00	1.63	1.16	0.17	0.60	0.21	0.21	NiO 0.04 BaO 0.07 SrO trace Li ₂ O trace	99.92	
A2. II	.855	.119	.015	.093	.272	.184	.032	.017			.008	.001	.003			
39	47.91	14.26	1.65	7.80	10.83	9.60	3.01	1.89	0.37		2.70		trace	Li ₂ O trace	100.02	
A3. III	.799	.140	.010	.108	.271	.171	.048	.020			.034		—			
40	51.56	15.24	2.73	5.99	8.30	7.67	3.78	1.85	0.16	0.15	1.81	0.47	0.15	Cr ₂ O ₃ 0.01 BaO 0.07 SrO 0.05 Li ₂ O trace	99.95	
A2. II	.859	.149	.017	.083	.208	.138	.060	.020			.023	.003	.002			
41	48.23	14.69	4.49	5.85	6.73	12.12	2.55	1.49	0.98	1.50	1.00	0.46	0.17	CO ₂ trace SO ₃ 0.05 Cl 0.09 F none Cr ₂ O ₃ 0.06	100.46	
A1. I	.804	.144	.028	.082	.168	.198	.041	.016			.013	.003	.002			
42	52.18	15.59	0.75	8.11	7.89	10.40	2.88	1.25	0.73		0.16	0.05	0.16	Cl trace S 0.01 NiO 0.14 CuO 0.05	100.35	3.00
A2. II	.870	.153	.005	.113	.197	.186	.047	.013			.002	—	.002			
43	50.80	10.43	3.95	6.91	12.13	10.17	2.77	1.52	0.67		0.30	trace	0.45	CO ₂ none ZrO ₂ none Cl 0.06 S none CoO none BaO 0.18 CuPb none	100.34	
A1. I	.847	.102	.025	.096	.303	.182	.045	.016			.004	—	.006			
44	54.51	12.26	1.64	7.60	6.89	8.80	2.37	1.85	0.94	0.04	1.74	0.78	0.32	CO ₂ 0.36 FeS ₂ 0.20 NiO 0.03 BaO none	100.33	
A2. II	.909	.120	.010	.106	.172	.157	.039	.020			.022	.006	.005			
45	52.84	14.06	1.73	8.38	5.55	8.72	2.90	1.74	1.15	0.08	2.19	0.29	0.25	FeS ₂ 0.14 NiO 0.05 BaO none	100.07	
A2. II	.881	.138	.011	.117	.139	.155	.047	.018			.027	.002	.004			
46	52.83	11.74	6.66	6.13	6.41	8.05	2.67	2.06	1.20	0.20	1.82	0.08				99.85
A2. II	.881	.115	.042	.085	.160	.144	.044	.022			.023	—				
47	51.53	11.05	2.73	10.98	5.21	9.68	3.48	0.86	1.26	0.71	1.53	0.22	0.45	CO ₂ 0.08 FeS ₂ 0.26 BaO none	100.07	
A2. II	.859	.109	.017	.153	.130	.173	.056	.009			.019	.002	.006			
48	49.92	12.83	6.96	6.21	3.78	7.25	3.72	1.73	1.05	3.58	2.04	0.45	0.52	CO ₂ none Cr ₂ O ₃ trace V ₂ O ₅ 0.04 NiO 0.03 BaO 0.09 SrO trace	100.20	
A1. I	.832	.126	.044	.086	.095	.130	.060	.018			.026	.003	.007			
49	49.53	15.05	4.49	9.07	4.25	8.08	3.93	1.25	1.06	1.47	1.76	0.43	0.29	SO ₃ 0.07 Cr ₂ O ₃ trace V ₂ O ₅ 0.01 NiO 0.04 BaO 0.05 SrO trace	100.83	
A1. I	.826	.148	.028	.126	.106	.145	.063	.014			.022	.003	.004			
50	47.45	14.83	2.47	14.71	5.00	8.87	2.97	0.99	1.00		1.47			CO ₂ 0.36	100.12	3.10
A3. III	.791	.145	.015	.204	.125	.139	.048	.011			.018					
51	45.10	15.04	8.85	4.62	6.68	8.71	3.78	1.04	1.76	1.31	2.66	0.56	0.45	CO ₂ none SrO 0.04	100.60	
A2. II	.752	.147	.056	.064	.167	.155	.061	.011			.033	.004	.006			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
37	(II)III.5.3(4).4. 2.1.2.2.	Q 5.22 di 13.20 or 7.75 hy 18.33 ab 22.01 mt 3.71 an 24.74 il 1.37 ap 0.34	Near Sonora, Tuolumne County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 731, 1896.	Diorite.	In W. T., p. 321.
38	III.5.3''(3)4. 1.1.2.2.	or 9.45 di 24.72 ab 16.77 hy 17.49 an 19.46 ol 5.41 mt 3.48 il 1.22 ap 0.34	Milton, Sierra County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 734, 1896.	Diabase porphyry.	In W. T., p. 321.
39	III.5''3.4. 2.3.2.2.	or 11.12 di 21.99 ab 15.72 ol 17.96 an 20.02 mt 2.32 ne 4.83 il 5.17	American Flat Creek, Washoe, Nevada.	S. L. Penfield.	Hague and Iddings, U. S. G. S. B. 17, p. 33, 1885.	Basalt.	In W. T., p. 321.
40	(II)III.5.3.4. 2.2.2.2.	or 11.12 di 13.03 ab 31.44 hy 5.46 an 19.18 ol 10.84 mt 3.94 il 3.50 ap 1.01	Salto de Anton, Cuernavaca, Mexico.	F. N. Guild.	F. N. Guild, A. J. S., XXII, p. 170, 1906.	Basalt.	K ₂ O given as 1.25.
41	'''III.5.3(4).4. 2.1.2.2.	or 8.90 di 22.49 ab 21.48 hy 6.58 an 24.19 ol 3.68 mt 6.50 il 1.98 ap 1.01	Monte Lirio, Panama.	W. C. Wheeler.	D. F. McDonald, U. S. G. S. rec. lab.	Basalt.	
42	'''III.5.3(4).4. 1.2.2.2.	or 7.23 di 21.15 ab 24.63 hy 6.90 an 25.85 ol 12.40 mt 1.16 il 0.30	Cuyuni River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Gui., p. 95, 1908.	Olivine dia- base.	
43	III.5.(2)3.4. 1.2.2.2.	or 8.90 di 31.32 ab 23.58 ol 17.92 an 11.40 mt 5.80 il 0.61	Mazaruni River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Gui., p. 78, 1908.	Basic syenite.	
44	III.(4)5.3.''4. 2.1.2.2.	Q 6.36 di 17.19 or 11.12 hy 19.26 ab 20.44 mt 2.32 an 16.96 il 3.34 ap 2.02	Carn Dubh, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot., Mem. XCIII, p. 95, 1912.	Gabbro.	
45	'''III.5.3.4. 2.1.2.2.	Q 2.28 di 17.10 or 10.01 hy 17.78 ab 24.63 mt 2.55 an 20.29 il 4.10 ap 0.67	Diebidale River, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot., Mem. XCIII, p. 95, 1912.	Gabbro.	
46	'''III.(4)5.''3.''4. 2.1.2.2.	Q 6.72 di 20.84 or 12.23 hy 8.82 ab 23.06 mt 9.74 an 13.62 il 3.50	Garabal Burn, n. Loch Lomond, Scotland.	Not stated.	Wyllie and Scott, G. Mag. (V), X, p. 540, 1913.	Diorite.	
47	III.5.(2)3.4(5). 2.3''2.3.	Q 0.24 di 28.27 or 5.00 hy 15.12 ab 29.34 mt 3.94 an 12.23 il 2.89 ap 0.67	Sheet 52, Scotland.	E. G. Radley.	G. S. Grt. Br., Sum. Prog. (1913), p. 82, 1914.	Tholeiite.	
48	(II)III.5.(2)3.4. 3.1.2.3.	Q 4.68 di 16.00 or 10.01 hy 4.89 ab 31.44 mt 10.21 an 13.34 il 3.95 ap 1.01	Eilean a' Bhaird, Canna Island, Scotland.	W. Pollard.	A. Harker, G. S. Scot., Mem. Sh. 60, p. 130, 1908.	Mugearite.	Not fresh?
49	(II)III.5.3.4''. 2.2.2.3.	or 7.78 di 14.72 ab 33.01 hy 7.50 an 19.74 ol 4.69 mt 6.50 il 3.34 ap 1.01	Ealaist, Canna Island, Scotland.	W. Pollard.	A. Harker, G. S. Scot., Mem. Sh. 60, p. 125, 1908.	Olivine dolerite.	
50	'''III.3''4''. 2.3.2.3.	or 6.12 di 17.11 ab 25.15 ol 1.79 an 23.91 mt 3.48 il 2.74	Scourie, Sutherland, Scotland.	J. J. H. Teall.	J. J. H. Teall. Q. J. G. S., XLI, p. 135, 1885.	Dolerite.	In W. T., p. 321.
51	'''III.5.3.4(5). 3.2.2.2.	or 6.12 di 14.47 ab 30.13 ol 7.00 an 20.85 mt 8.58 ne 0.99 il 5.02 hm 3.04 ap 3.14	Duncomb Hill, Kilpatrick Hills, Dumbartonshire, Scotland.	A. Scott.	G. W. Tyrrell, Tr. G. Soc. Glas., XIV (III), p. 247, 1912.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
52	46.28	14.18	3.79	7.34	10.82	9.88	2.58	1.01	1.66	0.31	2.06	0.44	0.09	CO ₂ none Cl none S none NiO 0.05 BaO none SrO none	100.49	
A1. I	.771	.139	.024	.102	.271	.177	.042	.011			.026	.003	.001			
53	51.22	14.06	4.32	8.73	4.42	8.33	2.55	1.25	1.28		2.42	0.25	0.16	CO ₂ 0.19 FeS ₂ 0.49	99.67	2.98
A2. II	.854	.138	.027	.121	.111	.148	.042	.014			.030	.002	.002			
54	50.71	14.78	3.52	8.95	5.90	8.21	2.76	1.39	1.78		1.92		0.31	CO ₂ 0.25	100.48	2.944
A2. II	.845	.145	.022	.125	.148	.146	.044	.015			.024		.004			
55	50.46	13.89	3.69	9.02	5.03	8.81	2.85	1.33	1.95		2.26	0.37	0.22	CO ₂ 0.19	100.07	2.853
A2. II	.841	.136	.023	.125	.126	.157	.046	.014		.028	.003	.003	.003			
56	50.55	15.00	2.54	7.90	6.25	7.85	3.53	1.10	3.14	0.55	1.58				99.99	
A2. II	.843	.147	.016	.110	.156	.140	.056	.012			.020					
57	49.67	12.46	1.77	8.71	10.50	9.57	2.42	0.63	2.82	0.37	1.13	0.13	0.09	CO ₂ trace	100.27	
A2. II	.828	.122	.011	.121	.263	.171	.039	.007			.017	.001	.001			
58	42.88	14.31	4.70	9.14	5.67	10.90	2.52	1.92	2.52	0.25	3.68	0.54	0.32	CO ₂ 0.13 S 0.22 NiO 0.07 BaO none SrO none	100.07	
A1. I	.715	.140	.029	.127	.142	.195	.040	.020			.046	.004	.005			
59	52.80	13.80	2.00	10.20	3.97	6.78	3.51	1.74	1.10		3.83	0.22			99.95	
A2. II	.880	.135	.013	.142	.099	.121	.056	.019			.048	.002				
60	51.90	13.78	0.80	11.00	4.76	6.72	4.02	1.39	2.50		3.44	0.19			100.40	
A2. II	.865	.135	.005	.153	.119	.120	.065	.015			.043	.001				
61	48.45	16.10	1.50	9.27	6.88	8.85	4.15	1.64	n. d.		3.22	trace			100.06	
A3. III	.808	.158	.009	.129	.172	.158	.067	.017			.040	—				
62	44.95	17.29	2.30	9.61	9.25	8.45	2.82	2.02	1.37		2.82	0.51			101.39	
B2. III	.749	.169	.014	.133	.231	.151	.045	.021			.035	.004				
63	47.66	14.36	2.83	8.44	8.19	9.36	3.51	1.54	0.17	0.20	3.83	0.45			100.54	
A2. II	.794	.141	.018	.117	.205	.167	.056	.016			.048	.003				
64	50.19	14.39	2.04	9.60	8.99	7.93	3.20	0.87	0.12	0.08	1.47	0.63	0.18	CO ₂ trace Cr ₂ O ₃ 0.03 NiO 0.11	99.83	
A2. II	.837	.141	.013	.133	.225	.141	.052	.009			.017	.004	.003			
65	49.75	14.14	3.45	8.80	8.92	7.69	3.15	0.97	0.44	0.25	1.38	0.62	0.16	CO ₂ trace Cr ₂ O ₃ 0.02 NiO 0.02	99.76	
A2. II	.829	.139	.022	.122	.223	.138	.051	.010			.017	.004	.002			
66	49.12	13.82	6.76	12.53	3.19	8.70	2.49	1.26	0.78		0.80		0.08		99.53	
A2. II	.819	.135	.042	.174	.080	.155	.040	.014			.010		.001			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
52	III.5.3(4).4. 2.1.2.2.	or 6.12 di 17.92 ab 21.48 ol 18.29 an 23.91 mt 5.57 ne 0.28 il 3.95 ap 1.01	Redside, East Lothian, Scotland.	E. G. Radley.	E. B. Bailey, G. S. Scot. Mem. Sh. 33, p. 121, 1910.	Basalt.	
53	(II)III.5.3''4. 2.1.2.3.	Q 7.02 di 13.44 or 7.78 hy 13.34 ab 22.01 mt 6.28 an 22.80 il 4.56 ap 0.67	Whin Sill, Cauldron Snout, Durham, England.	J. J. H. Teall.	J. J. H. Teall, Q. J. G. S., XL, p. 654, 1884.	Diabase.	In W. T., p. 321.
54	''III.5.3''4. 2.1.2.3.	Q 2.04 di 13.60 or 8.34 hy 18.06 ab 23.06 mt 5.10 an 23.91 il 3.65	Whin Sill, Bourgovicus, Northumberland, England.	J. J. H. Teall.	J. J. H. Teall, Q. J. G. S., XL, p. 654, 1884.	Diabase.	In W. T., p. 321.
55	''III.''5.3.4. 2.1.2.3.	Q 3.90 di 16.20 or 7.78 hy 14.80 ab 24.10 mt 5.34 an 21.13 il 4.26 ap 1.01	Whin Sill, England.	A. M. Finlay- son.	A. M. Finlayson, Q. J. G. S., LXVI, p. 304, 1910.	Diabase.	
56	(II)III.5.3.4''. 2.1.2.3.	or 16.67 di 13.92 ab 29.34 hy 15.54 an 21.96 ol 2.25 mt 3.71 il 3.04	Carn Llidi, St. Davids Head, Pembrokeshire, Wales.	J. V. Elsdén.	J. V. Elsdén, Q. J. G. S., LXIV, p. 281, 1908.	Gabbro.	
57	III.5.3(4).4(5). 1.2.2.2.	or 3.89 di 20.67 ab 20.44 hy 18.01 an 21.13 ol 7.83 mt 2.55 il 2.58 ap 0.34	St. Davids Head, Pembrokeshire, Wales.	J. V. Elsdén.	J. V. Elsdén, Q. J. G. S., LXIV, p. 278, 1908.	Biotite norite.	
58	III.5''3''4. 2.2.2.3.	or 11.12 di 22.96 ab 13.36 ol 7.69 an 22.24 mt 6.73 ne 4.12 il 6.99 ap 1.34	Lynher, Cornwall.	W. Pollard.	J. S. Flett, G. S. Eng., Mem. Sh. 348, p. 100, 1907.	Proterobase.	
59	(II)III.''5.3.4. 2.1.2.3.	Q 4.56 di 12.43 or 10.56 hy 14.42 ab 29.34 mt 3.02 an 16.68 il 7.30 ap 0.67	Mauny, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 121, 1913.	Microgabbro.	
60	6'''III.5.''3.4. 2.1.2.3.	or 8.34 di 14.32 ab 34.06 hy 16.11 an 15.29 ol 1.86 mt 1.16 il 6.54 ap 0.34	Moulin Huile, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 117, 1913.	Andesite.	"Rich in pyrite."
61	(II)III.5(6).3.4. 2.3.2.3.	or 9.45 di 19.00 ab 22.53 ol 13.46 an 20.57 mt 2.09 ne 6.82 il 6.08	Agde, Hérault, France.	Pisani.	A. Michel-Levy, C. R., CXLVIII, p. 1530, 1909.	Basalt.	
62	(II)III.5''3(4). ''4. 2.4.2.2.	or 11.68 di 8.60 ab 15.20 ol 21.97 an 28.63 mt 3.25 ne 4.54 il 5.32 ap 1.21	Bonne d'Ordanche, Mont Dore, Auvergne.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 192, 1902.	Nephelinic gabbro.	
63	III.5.3.4.⊙ 2.3.2.2.	or 8.90 di 19.59 ab 24.63 ol 12.88 an 19.18 mt 4.18 ne 2.56 il 7.30 ap 1.00	Castelfullit, n. Olot, Catalonia, Spain.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXIV, p. 239, 1907.	Basalt.	
64	III.5.3''4(5). 2.2.2.3.	or 5.00 di 10.85 an 27.25 hy 16.20 an 22.24 ol 11.07 mt 3.02 il 2.58 ap 1.34	Cape Augusta Victoria, Wood Bay, Spitzbergen.	M. Dittrich.	V. M. Goldschmidt, Skr. Vids. Krist., 1911, No. 9, p. 16.	Basalt.	
65	III.5.3.4''. 2.2.2.2.	or 5.56 di 10.57 ab 26.72 hy 17.97 an 21.68 ol 7.55 mt 5.10 il 2.58 ap 1.34	Cape Augusta Victoria, Wood Bay, Spitzbergen.	M. Dittrich.	V. M. Goldschmidt, Skr. Vids. Krist., 1911, No. 9, p. 16.	Basalt.	
66	III.5.3(4).4. 2.1.2.4.	Q 3.36 di 17.42 or 7.78 hy 15.40 ab 20.96 mt 9.74 an 22.52 il 1.52	Cape Weissenfels, King Charles Land, Spitzbergen.	N. Sahlbom.	A. Hamberg, G. F. F., XXI, p. 523, 1899.	Basalt.	In W. T., p. 321.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
67	47.90	16.55	5.67	7.50	4.44	9.35	3.23	2.08	0.20		1.91	0.32	0.60		99.75	
A2. II	.798	.162	.035	.104	.111	.167	.045	.022			.023	.002	.009			
68	51.23	12.70	4.00	10.48	6.51	8.40	3.04	1.55	0.39		1.21	0.19	trace		99.70	
A2. II	.854	.124	.025	.146	.163	.150	.049	.017			.015	.001	—			
69	48.66	14.06	3.87	10.34	5.53	8.73	2.45	1.42	1.00		2.60	0.79	0.22	S BaO 0.18 0.01	99.86	
A2. II	.811	.138	.024	.143	.138	.155	.040	.015			.033	.006	.003			
70	48.50	16.17	4.65	11.38	4.24	7.28	3.07	1.67	1.94		0.80	0.67	trace		100.37	2.860
A2. II	.808	.158	.029	.158	.106	.130	.050	.018			.010	.005	—		(100.07)	
71	45.82	17.34	1.70	11.69	5.81	8.98	3.32	1.42	0.51	0.21	2.20	0.56	0.22	S BaO trace trace	99.78	
A2. II	.754	.170	.011	.163	.145	.161	.053	.015			.028	.004	.003			
72	51.65	13.51	3.57	4.62	11.45	6.60	2.80	2.18	3.08		0.49	0.17			100.72	2.783
A2. II	.861	.132	.023	.064	.286	.118	.045	.023			.006	.001				
73	49.92	13.39	8.07	4.82	6.13	10.68	2.83	1.11	0.94		1.80	1.06			100.75	2.963
A3. III	.832	.131	.050	.067	.153	.191	.045	.012			.023	.007				
74	49.83	13.20	7.29	4.67	5.90	11.57	2.78	1.31	1.07		1.73	0.78			100.13	2.892
A2. II	.831	.129	.046	.065	.148	.207	.045	.014			.022	.005				
75	49.67	12.72	8.19	4.26	7.41	9.38	3.56	1.35	0.91		1.67	1.07			100.19	2.888
A2. II	.828	.125	.051	.059	.185	.168	.057	.015			.021	.008				
76	48.89	13.66	3.64	7.44	8.83	8.68	3.14	1.20	2.59		1.76	0.39		SO ₃ 0.07	100.29	2.876
A2. II	.815	.134	.022	.103	.221	.155	.050	.013			.022	.003				
77	48.83	12.90	4.81	6.55	7.68	9.89	3.32	1.43	1.24		1.89	1.27			99.81	2.938
A2. II	.814	.126	.030	.091	.192	.177	.053	.015			.024	.009				
78	52.28	10.66	3.05	4.81	11.58	9.75	2.42	1.43	1.35	0.37	0.92	1.44		CO ₂ 0.09 SO ₃ 0.12	100.27	
A2. II	.871	.104	.019	.067	.290	.174	.039	.015			.011	.010				
79	51.03	13.15	4.31	1.59	6.44	14.10	3.06	2.24	1.17		0.85	0.19		Cl trace Fe ₂ S ₃ 1.97	100.39	
A2. II	.851	.129	.027	.022	.161	.252	.049	.024			.011	.001				
80	52.97	14.22	3.29	6.72	7.44	7.07	3.05	0.76	1.18	1.23	1.70	0.25		CO ₂ 0.09 SO ₃ none	99.97	
A2. II	.883	.139	.021	.093	.186	.127	.049	.008			.021	.002				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
67	(II)III.5.3''4. 2.2.2.3.	or 12.23 di 14.94 ab 23.58 hy 5.64 an 26.41 ol 4.08 mt 8.12 il 3.50 ap 0.67	Tofteholmen, Christiania Fjord, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 83, 1899.	Essexite.	In W. T., p. 323.
68	III.5.3.4.⊙ 2.1.2.3.	or 9.45 di 20.34 ab 25.68 hy 16.66 an 16.12 ol 2.65 mt 5.80 il 2.28 ap 0.34	Halleberg, Sweden.	A. Merian.	A. Merian, N. J. B. B., III, p. 289, 1885.	Diabase.	In W. T., p. 323.
69	III.5.3(4).4. 2.1.2.3.	Q 2.18 di 11.87 or 8.34 hy 19.71 ab 20.96 mt 5.57 an 23.07 il 5.02 ap 2.02	Asleskär, Loftahammar, Sweden.	R. Mauzelius.	A. Gavelin, Sv. G. Und., Aarb. III, No. 7, p. 65, 1910.	Gabbro- diabase.	
70	(II)III.5.3''4. 2.2.2.3.	or 10.01 di 5.37 ab 26.20 hy 17.06 an 25.02 ol 4.88 mt 6.73 il 1.52 ap 1.68	Silfberg, Dalarne, Sweden.	O. Larsson.	M. Weibull, Lunds Un. Aarsk., XXXIII, (2), 1897, No. 4, p. 24.	Diabase.	Not in W. T.
71	(II)III.5''3(4).4. 2.4.2.3.	or 8.34 di 10.61 ab 19.39 ol 19.21 an 28.36 mt 2.55 ne 4.54 il 4.26 ap 1.34	Svartsbergviken, N. Ulön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 131, 1913.	Olivine diabase.	
72	III.5.3''4. 2.2.2.2.	or 12.79 di 11.21 ab 23.58 hy 17.81 an 17.79 ol 7.46 mt 5.34 il 0.91 ap 0.34	Rösseberg, n. Karpenstein, Aachen, Rheinland.	Lindner.	E. Dathe, Jb. Fr. G. L.-A., XIX, p. cxxix, 1899.	Vogesite.	Not in W. T.
73	''III.(4)5.3''4. 3.1.2.2.	Q 5.70 di 20.30 or 6.67 hy 5.90 ab 23.58 mt 10.21 an 20.57 il 3.50 hm 0.96 ap 2.35	Strutberg, Roth, Rhöngebirge.	P. Schmidt.	P. Schmidt, Ref. N. J., 1905, II, p. 213.	Dolerite.	
74	III.''5.3.4. 2.1.3.2. 2.1.2.2.	Q 4.14 di 25.92 or 7.78 hy 2.80 ab 23.58 mt 9.98 an 19.46 il 3.34 hm 0.48 ap 1.68	Strutberg, Roth, Rhöngebirge.	P. Schmidt.	P. Schmidt, Ref. N. J., 1905, II, p. 213.	Dolerite.	
75	III.5.''3.4.	Q 1.02 di 19.01 or 8.34 hy 9.70 ab 29.87 mt 8.82 an 14.73 il 3.19 hm 2.08 ap 2.69	Reupers, Roth, Rhöngebirge.	P. Schmidt.	P. Schmidt, Ref. N. J., 1905, II, p. 213.	Dolerite.	
76	III.5.3.4.⊙ 2.2.2.2.	or 7.23 di 16.49 ab 26.20 hy 9.38 an 19.74 ol 9.06 mt 5.10 il 3.34 ap 1.01	Gangolsberg, Roth, Rhöngebirge.	Halcke.	H. Proescholdt, Jb. Pr. G. L.-A., XIV, p. 12, 1894.	Dolerite.	In W. T., p. 323
77	III.5.3.4.⊙ 2.2.2.2.	or 8.34 di 19.70 ab 27.77 hy 8.85 an 16.12 ol 4.18 mt 5.67 il 4.56 ap 3.02	Gangolsberg, Roth, Rhöngebirge.	P. Schmidt.	P. Schmidt, Ref. N. J., 1905, II, p. 213.	Dolerite.	
78	III.5.3.4.⊙ 2.1.2.2.	Q 1.74 di 20.01 or 8.34 hy 24.43 ab 20.44 mt 4.41 an 13.90 il 1.67 ap 3.36	Muhlthal, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 15, 1906.	Gabbro.	Cf. No. 7, III.4.3.4.
79	III.5''''3.''4. 2.1.3.1.	or 13.34 di 34.78 ab 19.12 wo 4.29 an 15.01 mt 2.55 ne 3.55 il 1.67 hm 2.56 pr 1.97	Michelsberg, Katzenbuckel, Odenwald.	O. N. Heiden- reich.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 289, 1907.	Theralite.	
80	(II)III(4)5.3''4(5). 2.1.2.2.	Q 6.06 di 8.71 or 4.45 hy 21.01 ab 25.68 mt 4.87 an 22.52 il 3.99 ap 0.67	Abertshausen, Giessen, Hesse.	K. M. Jene.	W. Schottler, Abh. G. L.-A., Darm., IV (3), p. 466, 1908.	Trapp (diabase).	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
81	50.38	13.94	2.71	7.16	8.76	7.81	3.22	0.94	0.49	1.78	2.02	0.32		CO ₂ 0.15 SO ₃ none	99.68	
A2. II	.840	.137	.017	.100	.219	.139	.052	.010			.025	.002				
82	48.56	11.92	4.62	6.85	10.38	8.16	2.66	1.70	2.00	1.06	1.84	0.52		SO ₃ 0.65	100.92	
A2. II	.809	.117	.029	.095	.260	.146	.043	.018			.023	.004				
83	45.01	14.81	3.05	6.97	8.75	8.27	2.66	1.81	2.07	0.67	3.96	1.46		CO ₂ 0.31 SO ₃ 0.10	99.90	
A2. II	.750	.145	.019	.097	.219	.148	.043	.020			.050	.010				
84	43.81	15.32	1.51	7.61	12.82	9.12	2.57	1.85	1.50	0.29	2.36	0.88		CO ₂ 0.11 SO ₃ 0.23	99.98	
A2. II	.730	.150	.019	.106	.321	.163	.042	.020			.030	.006				
85	49.53	14.10	6.12	6.21	6.61	9.39	2.28	2.12	0.86		1.86	0.98			100.06	
A2. II	.826	.138	.038	.086	.165	.168	.037	.022			.023	.007				
86	49.08	13.43	6.49	5.92	9.58	8.92	3.42	1.00	0.32		1.82	0.51			100.49	
A2. II	.818	.132	.041	.082	.240	.159	.055	.011			.023	.004				
87	48.39	12.07	8.23	7.82	8.48	8.81	2.67	0.90	1.81		0.25	0.97		CO ₂ 0.36	100.76	
A2. II	.807	.118	.051	.108	.212	.157	.043	.010			.003	.007				
88	49.05	14.36	4.25	6.35	8.38	8.38	3.47	2.26	1.57		2.18	0.09	0.24		100.33	
A2. II	.818	.141	.027	.089	.210	.150	.055	.024			.027	—	.003			
89	45.96	11.77	5.35	5.85	14.02	8.64	2.63	1.81	1.35		1.90	0.56			99.84	
A2. II	.766	.115	.034	.082	.351	.154	.042	.020			.024	.004				
90	45.88	12.60	3.47	11.03	6.42	9.97	3.48	1.11	3.17	0.49	1.62	0.11	0.25	CO ₂ 0.15 S trace	99.75	2.98
A2. II	.765	.123	.022	.153	.161	.178	.056	.012			.020	.001	.003			
91	53.92	11.86	2.09	8.66	7.78	10.88	2.03	1.05	1.57		trace	0.12		SO ₃ 0.24	100.20	2.97
A3. III	.899	.116	.013	.120	.195	.195	.032	.012			—	.001				
92	53.48	15.35	1.63	7.96	5.68	8.48	2.75	2.19	1.25		0.92	0.31		SO ₃ 0.19	100.19	2.896
A2. II	.891	.150	.010	.111	.142	.152	.045	.023			.012	.002				
93	46.33	14.46	2.22	11.09	4.89	10.58	2.83	1.31	3.23		2.52	0.30		CO ₂ 0.27 SO ₃ 0.23 Cl 0.13	100.39	
A2. II	.772	.142	.014	.154	.122	.189	.045	.014			.032	.002				
94	47.97	13.57	2.89	8.42	8.67	8.43	3.37	2.01	2.18		1.92	0.51		SO ₃ 0.07	100.01	
A2. II	.800	.133	.018	.117	.217	.150	.055	.021			.024	.004				
95	46.43	13.88	3.54	8.42	8.24	8.38	3.78	1.85	2.22		2.47	0.57		CO ₂ 0.30 SO ₃ trace S trace Cu 0.13	100.23	
A2. II	.774	.136	.022	.117	.206	.150	.061	.020			.031	.004				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
81	III.5.3.4". 2.1.2.2.	or 5.56 di 12.57 ab 27.25 hy 20.70 an 20.85 ol 0.90 mt 3.94 il 3.80 ap 0.67	Arnsberg, Giessen, Hesse.	K. M. Jene.	W. Schottler, Abh. G. L.-A., Darm., IV (3), p. 466, 1908.	Trapp (diabase).	
82	III.5.3.4.⊙ 2.2.2.2.	or 10.01 di 16.98 ab 22.53 hy 13.86 an 15.57 ol 7.31 mt 6.73 il 3.50 ap 1.34	Galgenberg, Giessen, Hesse.	Tritt.	W. Schottler, Abh. G. L.-A., Darm., IV (3), p. 466, 1908.	Trapp (diabase).	
83	"III.5.3."4. 2.3.2.2.	or 11.16 di 7.26 ab 22.53 hy 3.86 an 22.80 ol 15.43 mt 4.41 il 7.60 ap 3.36	Kehrenberg, Giessen, Hesse.	G. Butzbach.	W. Schottler, Abh. G. L.-A., Darm., IV (3), p. 460, 1908.	Basalt.	
84	III.5(6).3"4. 2.4.2.2.	or 11.12 di 12.14 ab 10.22 ol 24.18 an 24.46 mt 4.41 ne 6.39 il 4.56 ap 2.02	Kesselbach, Giessen, Hesse.	G. Butzbach.	W. Schottler, Abh. G. L.-A., Darm., IV (3), p. 460, 1908.	Basalt.	
85	"III.5.3"(3)4. 2.1.2.2.	Q 3.48 di 14.55 or 12.23 hy 12.91 ab 19.39 mt 8.82 an 21.96 il 3.50 ap 2.35	Grenzebach, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 21.	Dolerite.	
86	III.5.3.4". 2.2.2.2.	or 6.12 di 17.47 ab 25.82 hy 8.39 an 18.35 ol 6.91 mt 9.51 il 3.50 ap 1.34	Londorf, Vogelsberg, Hesse.	A. Streng.	A. Streng, N. J., 1888, II, p. 211.	Dolerite.	In W. T., p. 323.
87	III.5.3.4.⊙ 2.1.2.2.	Q 1.44 di 16.25 or 5.56 hy 20.98 ab 22.53 mt 11.83 an 18.07 il 0.46 ap 3.25	Laubach, Vogelsberg, Hesse.	J. M. Ledroit.	J. M. Ledroit, Ber. Oberh. Ges., XXIV, p. 151, 1886.	Basalt.	In W. T., p. 323.
88	"III.5.3.4. 2.2.2.2.	Q 13.34 di 19.43 ab 24.10 ol 12.00 an 17.24 mt 6.26 ne 2.56 il 4.10	Klein Staufenberg, n. Kassel, Hesse.	Fromm.	F. Bender, In. Diss. Wur., p. 30, 1911.	Basalt.	
89	III.5.3."4. 2.3.2.2.	or 11.12 di 18.17 ab 17.29 ol 21.40 an 14.73 mt 7.89 ne 2.56 il 3.65 ap 1.34	Schwengeberg, Lange Berg, Hesse-Nassau.	M. Dittrich.	R. Bernges, N. J. B. B., XXXI, p. 623, 1911.	Leucite basalt.	
90	III.5(6).3.4". 2.2.2.3.	or 6.67 di 27.46 ab 20.44 ol 12.65 an 15.29 mt 5.10 ne 4.83 il 3.04 ap 0.34	Schönbach, n. Herborn, Hesse-Nassau.	E. Reuning.	E. Reuning, N. J. B. B., XXIV, p. 432, 1907.	Diabase.	
91	III.5.3(4).4. 1.1.2.3.	Q 4.14 di 27.26 or 6.67 hy 20.28 ab 16.77 mt 3.02 an 20.02 ap 0.34	Heppeln, Brocken, Harz.	Klüss.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXVII, p. 361, 1906.	Biotite gabbro.	
92	(II)III.5.3."4. 1.1.2.3.	Q 1.50 di 15.38 or 12.79 hy 18.88 ab 23.58 mt 2.32 an 22.80 il 1.82 ap 0.67	Riefenbach, n. Harzburg, Brocken, Harz.	Eyme.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXVII, p. 362, 1906.	Biotite gabbro.	
93	III.5.3"4. 2.2.2.3.	or 7.78 di 22.88 ab 22.01 ol 11.12 an 23.07 mt 3.25 ne 0.85 il 4.86 ap 0.67	Forstort Winde, n. Rübeland, Harz.	Not stated.	O. H. Erdmannsdoerfer, N. J. Cb., 1909, p. 40.	Diabase.	
94	III.5."3.4. 2.3.2.2.	or 11.68 di 17.95 ab 24.10 ol 16.43 an 15.85 mt 4.18 ne 2.56 il 3.65 ap 1.34	Bramburg, Sollings, Prussia.	Klüss.	H. Stremme, Jb. Pr. G. L.-A., XXXII (I), p. 284, 1911.	Basalt.	
95	III.5(6)."3.4. 2.3.2.2.	or 11.12 di 18.35 ab 21.48 ol 14.57 an 15.29 mt 5.10 ne 5.68 il 4.71 ap 1.34	Bramburg, Sollings, Prussia.	Eyme.	H. Stremme, Jb. Pr. G. L.-A., XXXII (I), p. 284, 1911.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 8. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
96	46.19	12.15	3.28	7.81	11.65	8.53	3.05	2.02	2.63		2.01	1.03		CO ₂ 0.18	100.53	2.92
A2. II	.770	.119	.021	.108	.291	.151	.049	.021			.025	.007				
97	51.03	14.82	2.23	5.61	9.77	7.01	4.19	1.05	3.49		0.95		0.18		100.33	
A2. II	.851	.145	.014	.078	.244	.125	.088	.012			.012		.003			
98	47.31	16.66	2.67	6.55	8.20	9.61	3.40	1.44	2.88		1.33				100.05	2.99
A3. III	.789	.163	.016	.091	.205	.171	.055	.016			.017					
99	45.17	13.00	9.08	5.04	6.66	12.64	2.72	1.88	2.12	0.10	1.47				99.88	
A3. III	.753	.127	.057	.070	.167	.226	.044	.020			.018					
100	53.48	13.59	1.78	8.30	5.88	7.20	4.38	1.02	0.79	0.11	2.52	0.59			99.64	
A2. II	.892	.133	.011	.115	.147	.129	.071	.011			.031	.004				
101	52.40	15.26	0.74	8.33	7.45	7.33	3.54	0.99	0.29	0.06	3.12	0.49	0.08	NiO 0.06	100.14	
A2. II	.873	.150	.005	.115	.186	.130	.057	.011			.039	.004	.001			
102	52.20	13.20	1.29	7.91	8.71	7.95	3.20	1.01	1.68	0.29	2.00	0.24			99.68	
A2. II	.870	.129	.008	.110	.218	.142	.052	.011			.025	.002				
103	49.00	15.63	4.03	5.00	7.86	8.16	3.93	2.60	0.13	0.18	3.25	0.63			100.40	
A2. II	.817	.153	.025	.069	.197	.146	.063	.028			.041	.004				
104	51.01	15.09	2.07	6.88	6.52	11.34	2.53	2.02	0.15		0.83	1.44	0.13	ZrO ₂ none SO ₃ 0.06 Cr ₂ O ₃ 0.05	100.12	
A. I	.850	.148	.013	.096	.163	.202	.040	.021			.010	.010	.002			
105	50.83	16.66	1.52	6.64	6.08	10.99	2.66	2.05	0.36		0.81	1.61	0.12		100.33	
A2. II	.847	.163	.009	.092	.152	.196	.043	.022			.010	.011	.102			
106	48.46	15.92	3.42	8.00	5.05	10.02	4.13	1.61	0.01	0.03	2.03	0.65	0.18	CO ₂ none ZrO ₂ none SO ₃ 0.14 SrO 0.09 Ba	99.74	
A2. II	.808	.156	.021	.111	.126	.179	.066	.017			.025	.005	.003			
107	46.40	14.34	4.09	8.22	7.00	9.85	3.59	1.00	0.14	0.08	4.54	0.85	0.25	CO ₂ none ZrO ₂ none SO ₃ 0.12 BaO 0.09 SrO 0.03	100.59	
A1. I	.773	.141	.026	.114	.175	.177	.058	.011			.057	.006	.003			
108	46.22	12.23	4.91	7.71	6.74	9.86	3.39	1.13	0.17	0.05	5.68	1.46			99.55	
A2. II	.770	.120	.031	.107	.169	.176	.055	.012			.071	.010				
109	45.72	12.45	1.57	12.01	5.29	9.58	3.40	1.08	0.40	0.01	6.43	1.54	0.16	CO ₂ none NiO 0.15 SrO 0.03	99.82	
A2. II	.762	.122	.010	.167	.132	.171	.055	.011			.080	.010	.002			
110	44.83	11.73	1.35	11.79	5.50	9.63	3.34	1.40	0.81	0.10	6.88	2.14	0.20		99.70	
A2. II	.747	.115	.009	.164	.138	.172	.054	.015			.086	.015	.003			

ORDER 4. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
96	III.5''3.(3)4. 2.3.2.2.	or 11.67 di 17.51 ab 19.91 ol 20.72 an 13.62 mt 4.37 ne 3.12 il 3.80 ap 2.35	Breitenberg, n. Oberellen, Prussia.	Not stated.	F. Beyschlag, Erl. G. Kt. Pr., Bl. Altmorschen, p. 24, 1891.	Basalt.	In W. T., p. 323
97	(II)III.5.3.4(5). 2.3.2.2.	or 6.67 di 13.34 ab 35.63 hy 0.33 an 18.07 ol 17.86 mt 3.25 il 1.82	Mount Goryczkowy, Posredni, Tatra Mountains, Hungary.	Z. Weyberg.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Diorite.	
98	(II)III.5''3.4. 2.3.2.2.	or 8.90 di 17.57 ab 19.39 ol 14.22 an 25.58 mt 3.71 ne 5.11 il 2.58	Val Rosegg, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Gabbro- diorite.	
99	III.5(6).3.''4. 2.1.3.2.	or 11.12 di 35.21 ab 12.05 ol 0.28 an 17.51 mt 12.06 ne 5.94 il 2.74 hm 0.80	Trift, Aarmassif, Switzerland.	O. Fischer.	O. Fischer, T. M. P. M., XXIV, p. 87, 1905.	Amphibolite (horn- blende gabbro).	
100	''III.5.(2)3.4(5). 2.1.2.3.	Q 0.78 di 14.74 or 6.12 hy 17.13 ab 37.20 mt 2.55 an 14.18 il 4.71 ap 1.34	Monte Austida, Sardinia.	H. S. Washing- ton.	H. S. Washington, C. R. Cong. G. Int., XII, p. 231, 1914.	Basalt.	
101	''III.5.3.4''. 2.1.2.3.	Q 0.48 di 7.88 or 6.12 hy 24.28 ab 29.87 mt 1.16 an 22.80 il 5.93 ap 1.34	Cuglieri, Monte Ferru, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXIX, p. 524, 1915.	Basalt.	
102	III.5.3.4''. 2.1.2.2.	or 6.12 di 15.48 ab 27.25 hy 23.62 an 18.35 ol 0.62 mt 1.86 il 3.80 ap 0.67	Monte Tuvonari, Monte Ferru, Sardinia.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXIX, p. 524, 1915.	Basalt.	
103	(II)III.5''(2)3.4. 2.2.2.2.	or 15.57 di 15.37 ab 25.15 ol 9.09 an 17.24 mt 5.80 ne 4.26 il 6.23 ap 1.34	Tres Nuraghes, n. Bosa, Sardinia.	H. S. Washing- ton.	H. S. Washington, Q. J. G. S., LXIII, p. 74, 1907.	Basalt.	
104	III.5.3''(3)4. 1.1.2.2.	or 11.68 di 19.00 ab 20.96 hy 14.24 an 23.63 ol 2.93 mt 3.02 il 1.52 ap 3.36	November, 1915, Stromboli, Aeolian Islands.	H. S. Washing- ton.	F. A. Perret, A. J. S., XLII, p. 451, 1916.	Basalt.	
105	(II)III.5.3(4)''4. 1.2.2.3.	or 12.23 di 13.82 ab 22.53 hy 12.38 an 27.24 ol 4.22 mt 2.09 il 1.52 ap 3.70	August, 1914, Stromboli, Aeolian Islands.	H. S. Washing- ton.	F. A. Perret, A. J. S., XLII, p. 451, 1916.	Basalt.	
106	(II)III.5''3.4. 2.2.2.3.	or 9.45 di 20.24 ab 15.68 ol 8.50 an 20.29 mt 4.87 ne 4.83 il 3.80 ap 1.68	Lava of 1910, Mount Etna, Sicily.	H. S. Washing- ton.	Unpublished.	Basalt.	
107	III.5.3.4''. 2.2.2.3.	or 6.12 di 18.81 ab 28.30 ol 9.32 an 20.02 mt 6.03 ne 1.14 il 8.66 ap 2.02	Cuddia Ferle, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 711, 1914.	Basalt.	
108	III.5.3.4.⊙ 2.1.2.3.	or 6.67 di 19.54 ab 28.82 hy 8.09 an 14.73 ol 0.28 mt 7.19 il 10.79 ap 3.36	Monte Sant'Elmo, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G., XXI, p. 711, 1914.	Basalt.	
109	III.5.3.4''. 2.2.2.3.	or 6.12 di 18.77 ab 28.82 hy 5.74 an 15.57 ol 6.29 mt 2.32 il 12.16 ap 3.36	Costa Zeneti, Pantelleria.	H. S. Washing- ton.	H. S. Washington, J. G. XXI, p. 711, 1914.	Basalt.	Dike in tuff.
110	III.5.(2)3.4. 3.2.2.3.	or 8.34 di 17.22 ab 28.30 hy 5.21 an 12.79 ol 6.78 mt 2.09 il 13.07 ap 5.04	Foerstner Volcano, n. Pantelleria.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXVII, p. 145, 1909.	Basalt.	Submarine eruption of 1891.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
111	48.06	15.90	3.37	7.97	7.11	9.37	3.19	0.85	0.40	0.06	3.31	0.36	0.06	CO ₂ none Cl 0.14 NiO 0.09 CuO none	100.24	
A1. I	.801	.156	.021	.111	.178	.168	.052	.009			.041	.003	—			
112	46.55	14.55	3.17	7.88	8.61	8.75	3.71	1.62	0.14	0.03	3.84	0.55	0.10	NiO 0.12	99.62	
A2. II	.776	.143	.020	.110	.215	.156	.060	.017			.048	.004	.001			
113	45.75	13.98	3.23	8.02	14.69	7.11	3.10	1.10	0.16	0.04	2.90	0.36	0.06	CO ₂ none Cr ₂ O ₃ trace NiO 0.14	100.64	
A2. II	.763	.137	.020	.111	.367	.127	.050	.012			.036	.003	—			
114	50.42	13.35	3.92	12.00	3.99	7.99	2.77	1.35	1.04		2.25	0.15	0.35	FeS ₂ 0.48 NiO 0.07	100.13	3.017
A2. II	.840	.131	.024	.167	.100	.143	.045	.015			.028	.001	.005			
115	49.15	11.48	3.97	13.22	5.39	8.63	2.64	1.36	0.37	0.20	2.41	0.32	0.44	FeS ₂ 0.22 NiO 0.07 BaO 0.04	99.91	3.090
A1. I	.819	.112	.025	.183	.135	.154	.043	.015			.030	.002	.006			
116	47.73	13.33	0.68	14.99	5.63	7.41	2.77	1.17	"In-crease."	0.11	4.04	0.61	0.30	Cl S 0.10 0.26	99.13	
A3. III	.796	.131	.004	.208	.141	.132	.045	.012			.049	.004	.004			
117	47.34	14.03	0.80	17.20	2.24	6.89	2.74	2.34	"In-crease."	0.05	4.17	1.07	0.21	Cl S 0.10 0.30	99.48	
A3. III	.789	.137	.005	.239	.056	.123	.044	.025			.051	.008	.003			
118	46.97	16.16	10.66	4.38	4.56	9.02	4.76	1.26	1.74		0.14		0.75		100.40	2.988
A2. II	.783	.159	.067	.061	.114	.161	.077	.014			.002		.011			
119	44.57	13.58	12.97	5.43	5.17	11.09	3.81	0.97	1.96				0.17		99.72	3.077
A3. III	.743	.133	.081	.075	.129	.198	.061	.011					.002			
120	46.44	16.30	4.82	7.07	4.92	10.03	3.82	1.44	1.40		2.90	0.82		S 0.08	100.04	2.906
A2. II	.774	.180	.030	.099	.123	.179	.061	.015			.036	.006				
121	45.69	17.02	4.59	8.52	5.62	11.31	3.21	1.07	0.76		1.30	0.57		Cl S 0.04 0.08	99.91	2.965
A2. II	.762	.167	.029	.118	.141	.202	.052	.012			.016	.004				
122	44.86	16.18	7.22	7.10	5.34	9.95	3.78	1.39	0.85		2.52	0.92		S 0.06	100.17	2.939
A2. II	.748	.159	.045	.099	.134	.178	.061	.015			.032	.006				
123	44.50	13.85	3.47	9.02	11.00	10.06	2.70	0.92	0.71		2.61	0.84		S 0.07	99.75	3.034
A2. II	.742	.136	.022	.125	.275	.180	.044	.010			.033	.006				
124	44.40	15.40	5.20	7.81	7.23	9.92	2.83	1.19	2.15		2.77	0.77		S 0.04	99.71	2.931
A2. II	.740	.151	.033	.108	.181	.177	.045	.013			.035	.005				
125	43.85	12.94	2.70	10.51	11.90	9.49	2.42	1.06	1.69		2.53	0.61		S 0.05	99.75	3.006
A2. II	.731	.127	.017	.146	.298	.170	.039	.012			.032	.004				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
111	III.5.3(4).4''. 2.2.2.3.	or 5.00 di 13.63 ab 26.20 ol 5.31 an 26.97 mt 4.87 il 6.23 ap 1.01	Monte Ponente, Linosa Island.	H. S. Washing- ton.	H. S. Washington, J. G., XVI, p. 17, 1908.	Basalt.	
112	III.5''3.4. 2.3.2.2.	or 9.45 di 17.05 ab 23.32 ol 5.31 an 18.35 mt 4.64 ne 4.40 il 7.30 ap 1.34	Il Fosso, Linosa Island.	H. S. Washing- ton.	H. S. Washington, J. G., XVI, p. 23, 1908.	Basalt.	Block in tuff.
113	III.5.3.4.⊙ 2.4.1.2.	or 6.67 di 9.26 ab 22.01 ol 28.17 an 20.55 mt 4.64 ne 2.27 il 5.47 ap 1.01	Monte Raneri, Linosa Island.	H. S. Washing- ton.	H. S. Washington, J. G., XVI, p. 26, 1908.	Olivine basalt.	
114	III.5.3.4.⊙ 2.1.2.4.	Q 2.94 di 16.12 or 8.34 hy 17.72 ab 23.58 mt 5.57 an 19.74 il 4.26 ap 0.34	Schtscheliki, Lake Onega, Olonez, Russia.	W. Wahl.	W. Wahl, T. M. P. M., XXVI, p. 124, 1907.	Diabase.	
115	III.5.3.4.⊙ 2.1.2.3.	or 8.34 di 21.33 ab 22.33 hy 20.65 an 15.01 mt 5.80 il 4.56 ap 0.67	Schtscheliki, Lake Onega, Olonez, Russia.	W. Wahl.	W. Wahl, Fennia, XXIV, No. 3, p. 20, 1908.	Diabase.	
116	III.5.3.4.⊙ 2.2.2.3.	or 6.67 di 10.33 ab 23.58 hy 20.71 an 20.67 ol 6.93 mt 0.93 il 7.45 ap 1.34	Goroshki, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, Ref. N. J., 1899, I, p. 463.	Olivine gabbro.	In W. T., p. 325.
117	III.5.3.(3)4. 2.2.2.4.	or 13.90 di 6.72 ab 23.06 hy 19.31 an 18.90 ol 5.29 mt 1.16 il 7.25 ap 2.09	Goroshki, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, Ref. N. J., 1899, I, p. 463.	Olivine- pyroxene syenite.	In W. T., p. 325.
118	(II)III.5(6)''3.4''. 3.1.2.3.	or 7.78 di 20.19 ab 27.51 ol 1.78 an 18.90 mt 15.54 ne 6.96 il 0.30	Dalnaya Gora, S. Ural Moun- tains, Russia.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XXIII, p. 123, 1904.	Augite diorite (gabbro).	
119	III.5(6).3.4(5). 3.1.3.2.	or 6.12 di 27.86 ab 22.01 wo 0.93 an 16.96 mt 17.86 ne 5.40 hm 0.64	Beresowaya Gora, Ural Mountains.	J. Morozewicz.	J. Morozewicz, C. G. Rus. Mem. XVIII, No. 1, p. 10, 1901.	Augite diorite.	Also in T. M. P. M., XXIII, p. 120, 1904.
120	(II)III.5.3.4. 3.2.2.3.	or 8.34 di 16.71 ab 26.72 ol 6.21 an 23.35 mt 6.96 ne 2.84 il 5.47 ap 2.02	Punta do Sol, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Trachydoler- ite.	
121	(II)III.5''3(4).4. 2.2.2.3.	or 6.67 di 19.31 ab 18.86 ol 10.37 an 28.63 mt 6.73 ne 4.54 il 2.43 ap 1.34	Soca, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 399, 1912.	Essexite.	
122	(II)III.5''3.4. 3.2.2.3.	or 8.34 di 16.55 ab 23.58 ol 6.02 an 23.07 mt 10.44 ne 4.54 il 4.86 ap 2.02	Pico Serrado, Madeira.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Trachydoler- ite.	
123	III.5.3(4).4''. 2.3.2.2.	or 5.56 di 17.36 ab 18.34 ol 20.42 an 22.80 mt 5.10 ne 2.56 il 5.02 ap 2.02	Punta Delgada, n. Sao Vicente, Madeira.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Essexite- melaphyre.	
124	III.5.3(4).4. 2.3.2.2.	or 7.23 di 14.85 ab 23.06 ol 11.68 an 25.85 mt 7.66 ne 0.28 il 5.32 ap 1.68	Lombo Grande Curral, Madeira.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 428, 1912.	Trachydoler- ite.	
125	III.5''3(4).4. 2.3.2.2.	or 6.67 di 18.14 ab 14.41 ol 24.44 an 21.13 mt 3.94 ne 3.27 il 4.86 ap 1.34	Ribeira de Massapez, Madeira.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Essexite porphyry.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
126	43.79	13.73	3.37	10.20	9.46	10.54	2.71	1.25	1.66		2.82	0.67		S 0.04	100.24	3.022
A2. II	.730	.135	.021	.142	.237	.188	.044	.014			.035	.005				
127	42.40	14.19	6.14	7.69	9.02	11.08	2.50	1.43	1.37		3.68	0.67		S 0.06	100.23	3.033
A2. II	.707	.139	.038	.107	.226	.198	.040	.015			.046	.005				
128	42.19	13.80	5.52	8.87	8.55	11.39	2.50	1.21	1.91		3.15	0.72		S 0.12	99.85	3.010
A2. II	.703	.135	.034	.124	.214	.204	.040	.013			.039	.005				
129	47.95	16.18	3.95	6.21	7.92	8.01	4.68	1.02	1.50		2.68	0.32			100.42	
A2. II	.799	.159	.025	.086	.198	.143	.076				.034	.002				
130	47.81	13.71	6.31	5.83	7.47	9.28	2.27	1.62	1.99	0.65	2.87	0.52	0.11		100.44	
A2. II	.787	.134	.039	.081	.187	.166	.037	.017			.036	.004	.002			
131	45.73	11.20	6.46	5.53	11.36	10.45	2.19	1.36	1.20	0.50	3.23	0.21	0.54	Cr ₂ O ₃ 0.16	100.12	
A2. II	.762	.110	.041	.076	.284	.187	.035	.015			.040	.001	.008			
132	49.05	13.73	8.26	9.31	3.96	7.01	3.34	1.89	0.62	0.68	0.32		0.41		99.97	
A2. II	.818	.135	.052	.129	.099	.125	.054	.020			.004		.006			
133	48.50	12.32	10.87	5.33	5.36	10.42	3.45	1.74	0.39		2.23	0.24	trace		100.85	
A2. II	.808	.121	.068	.074	.134	.186	.056	.018			.028	.002	—			
134	46.60	15.06	12.26	6.15	2.58	9.66	3.89	0.97	0.80		1.98	0.44	0.71	CO ₂ SO ₂ trace	101.10	
B2. III	.777	.148	.077	.086	.065	.172	.063	.010			.025	.003	.010			
135	50.62	16.45	2.61	7.02	6.61	9.23	3.04	1.42	0.18	0.37	1.77	0.39			99.71	
A2. II	.847	.161	.016	.097	.165	.164	.049	.015			.022	.003				
136	47.81	13.94	3.26	8.35	9.52	8.73	2.97	0.87	2.16		2.07	0.67	0.25		100.62	
A2. II	.797	.137	.021	.116	.238	.155	.048	.009			.026	.005	.004			
137	44.55	16.25	1.90	14.40	9.43	6.29	3.29	1.04	0.12		3.45	0.06			100.78	
A2. II	.743	.159	.012	.200	.236	.113	.053	.011			.043	—				
138	47.22	15.21	3.99	6.55	7.37	8.49	3.29	2.18	0.56		2.60	0.41			99.75	
A2. II	.787	.149	.025	.091	.184	.152	.053	.023			.033	.003				
139	47.38	11.51	5.17	8.49	6.87	11.43	2.02	1.76	0.97		3.65	0.52			99.77	
A2. II	.790	.113	.032	.118	.172	.204	.032	.019			.046	.004				
140	46.70	13.21	2.62	7.26	11.48	9.76	2.28	1.36	2.44		2.36	0.31			99.78	
A2. II	.778	.129	.016	.101	.287	.174	.037	.015			.030	.002			(99.72)	

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
126	III.5(6).3''4. 2.3.2.2.	or 7.78 di 21.10 ab 13.10 ol 17.98 an 21.41 mt 4.87 ne 5.40 il 5.32 ap 1.68	Rabaçal, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Trachydolerite.	
127	III.5''3(4).4. 2.2.2.2.	or 8.34 di 21.24 ab 13.10 ol 11.09 an 23.35 mt 8.82 ne 4.26 il 6.99 ap 1.68	Nossa Senhora, Gran Curral, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Trachydolerite.	
128	III.5(6).3(4).4. 2.2.2.2.	or 7.23 di 23.32 ab 12.05 ol 12.19 an 22.80 mt 7.89 ne 4.83 il 5.93 ap 1.68	Canical, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Limburgitic trachydolerite.	
129	(II)III.5''3.4(5). 2.3.2.2.	or 6.12 di 14.08 ab 29.87 ol 11.88 an 20.02 mt 5.80 ne 5.40 il 5.17 ap 0.67	Les Mamelles, Cap Verde, Senegal.	Pisani.	J. Chantard, C. R., CXLIII, p. 921, 1906.	Basalt.	Also in B. Soc. G. Fr. (4), VII, p. 437, 1907.
130	III.5.3(4).4. 2.1.2.2.	Q 2.70 di 15.87 or 9.45 hy 12.36 ab 19.39 mt 9.05 an 22.24 il 5.47 ap 1.34	Fernando Poo Island, West Africa.	A. Lindner.	W. Boese, N. J. B. B., XXXIV, p. 280, 1912.	Basalt.	Three decimals.
131	III.5.3.4.⊙ 2.2.2.2.	or 8.34 di 25.95 ab 18.34 hy 3.70 an 16.68 ol 9.16 mt 9.51 il 6.08 ap 0.67	St. Isabel, Fernando Poo Island, West Africa.	A. Lindner.	W. Boese, N. J. B. B., XXXIV, p. 294, 1912.	Basalt.	Three decimals.
132	III.5.3.4. 2.1.2.3.	Q 0.60 di 14.72 or 11.12 hy 13.03 ab 28.30 mt 12.06 an 16.96 il 0.61	Tegele, Kordofan.	D. Schimpff.	G. Linck, N. J. B. B., XVII, p. 437, 1903.	Gabbro- porphyrite.	TiO ₂ low?
133	III.5.2(3).4. 3.1.3.2.	Q 0.24 di 28.51 or 10.01 hy 0.20 ab 29.34 mt 10.67 an 13.07 il 4.26 hm 3.52 ap 0.67	Alid Volcano, Buia, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 132, 1909.	Olivine basalt.	
134	(II)III.5.3.4(5). 3.1.3.3.	Q 2.22 di 14.04 or 5.56 wo 2.55 ab 33.01 mt 16.47 an 20.85 il 3.80 hm 0.96 ap 1.01	Aden, Arabia.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XXIV, p. 178, 1908.	Basalt.	
135	(II)III.5.3(4).4. 2.1.2.2.	or 8.34 di 12.79 ab 25.68 hy 13.52 an 26.97 ol 3.46 mt 3.71 il 3.34 ap 1.01	Near Amboutra, Madagascar.	Not stated.	A. Lacroix, pers. com.	Hypersthene gabbro.	
136	III.5.3''4''. 2.2.2.2.	or 5.00 di 12.91 ab 25.15 hy 11.30 an 22.24 ol 11.51 mt 4.87 il 3.95 ap 1.68	Near Trtriw, Antsirabe, Madagascar.	Not stated.	Duparc, Wunder and Sabot, Mem. Soc. Phys. Gen., XXXVI, p. 298, 1910.	Basalt.	
137	III.5.3(4).4''. 2.4.1.3.	or 6.12 di 4.11 ab 21.48 ol 29.83 an 26.41 mt 2.78 ne 3.41 il 6.54	Anabohitsy, n. Ampanihy, Mahafaly, Madagascar.	Pisani.	A. Lacroix, B. Soc. Min. Fr., XXXI, p. 323, 1908.	Troctolite.	
138	(II)III.5.3.4. 2.3.2.2.	or 12.79 di 15.22 ab 24.10 ol 11.10 an 20.29 mt 5.80 ne 1.99 il 5.02 ap 1.01	Soanindravina, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Basalt.	
139	III.5.3.(3)4. 2.1.2.3.	Q 1.14 di 28.63 or 10.56 hy 8.81 ab 16.77 mt 7.42 an 17.24 il 6.90 ap 1.34	Bras Rouge, Cilaos, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 543, 1912.	Gabbro.	
140	III.5.3(4)4. 2.3.2.2.	or 8.34 di 19.89 ab 19.39 hy 1.28 an 21.41 ol 18.05 mt 3.71 il 4.58 ap 0.67	Cilaos, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 543, 1912.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
141	45.57	17.16	3.64	8.41	5.33	10.33	3.10	1.88	0.94		2.82	0.54			99.72	
A2. II	.760	.168	.023	.117	.133	.184	.050	.020			.035	.004			(99.74)	
142	47.67	14.20	3.59	9.18	6.24	8.98	3.21	2.41	0.92		2.64	0.66		SO ₃ trace S 0.10	99.80	2.889
A2. II	.795	.139	.023	.128	.156	.161	.052	.026			.033	.005				
143	50.42	13.32	5.15	8.52	5.89	10.70	2.63	1.22	0.61		1.18	0.20			99.84	
A2. II	.840	.131	.032	.118	.147	.191	.042	.013			.015	.001				
144	53.29	13.20	1.14	10.72	7.78	6.81	2.38	1.40	1.22	0.71	1.14	0.08	0.15		100.02	
A2. II	.888	.129	.007	.149	.195	.121	.029	.015			.014	—	.002			
145	49.03	14.43	1.29	9.40	11.93	7.28	3.14	1.24	0.73		1.71	0.44	trace		100.62	
A2. II	.817	.141	.008	.131	.300	.130	.051	.013			.021	.003	—			
146	47.56	14.13	1.89	10.00	8.37	8.43	2.95	1.38	1.92		2.77	0.66	0.13		100.29	
A2. II	.793	.139	.012	.139	.209	.150	.048	.015			.035	.005	.002		(100.19)	
147	42.93	10.71	6.03	6.14	11.48	11.21	2.42	1.98	2.78		2.48	1.38	1.23		100.77	
A2. II	.716	.105	.038	.085	.287	.200	.039	.021			.031	.010	.018			
148	51.35	14.50	1.77	9.99	3.75	8.50	2.62	1.77	2.62		3.80				100.67	
A3. III	.856	.142	.011	.139	.094	.152	.042	.019			.048					
149	47.40	13.96	2.30	10.80	6.87	7.65	2.57	1.62	2.70		3.70	0.39			99.76	
A2. II	.790	.137	.014	.150	.172	.137	.042	.017			.046	.003				
150	50.04	11.65	2.63	15.76	5.58	7.89	3.08	0.89	0.19		1.93	0.20			99.84	
A2. II	.834	.114	.016	.219	.140	.141	.050	.009			.024	.001				
151	54.10	13.42	4.06	7.43	4.43	7.97	3.87	1.15	0.88	none	2.35	0.46	0.30		100.36	2.79
A2. II	.902	.131	.025	.103	.111	.143	.063	.012			.030	.003	.004			
152	50.27	12.50	2.44	8.18	10.25	7.52	3.29	1.42	1.14	0.46	2.26	0.60	0.18		100.57	2.88
A2. II	.838	.123	.015	.114	.256	.134	.053	.015			.028	.004	.003			
153	48.55	12.45	3.60	10.43	7.64	7.58	3.20	1.75	1.66	0.34	1.34	0.61	0.25		99.40	
A2. II	.809	.122	.023	.144	.191	.136	.052	.019			.017	.004	.002			
154	47.50	14.19	1.78	12.15	5.06	7.47	3.85	1.58	1.59	0.33	3.08	0.79	0.20		99.57	2.79
A2. II	.792	.139	.011	.169	.127	.134	.062	.017			.029	.005	.003			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
141	(II)III.5''3''4. 2.2.2.3.	or 11.12 di 16.57 ab 18.08 ol 9.42 an 27.24 mt 5.34 ne 4.40 il 5.32 ap 1.34	Gilaos, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 541, 1912.	Essexitic gabbro.	
142	''III.5.3''4. 2.3.2.3.	or 14.46 di 18.89 ab 22.79 ol 11.49 an 16.96 mt 5.34 ne 2.41 il 5.02 ap 1.68	Mukira Lava Field, Lake Kivu Dis- trict, German Central Africa.	Eyme.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 18, 1912.	Leucite basanite.	
143	III.5.3''4. 2.1.2.3.	Q 1.68 di 25.34 or 7.23 hy 11.72 ab 22.01 mt 7.42 an 21.13 il 2.28 ap 0.34	Lebombo Mountain, Swaziland, Transvaal.	R. Reinisch.	J. M. Henderson, Tr. G. Soc. S. Afr., XII, p. 30, 1910.	Diabase.	
144	III.5.3''4. 1.1.2.3.	Q 2.70 di 10.52 or 8.34 hy 31.22 ab 20.44 mt 1.62 an 20.85 il 2.13	Umhlatuzi Crossing, Zululand, Natal.	G. T. Prior.	G. T. Prior, Ann. Natal Mus., II (2), p. 149, 1910.	Dolerite.	
145	III.5.3.4.⊙ 1.4.2.2.	or 7.23 di 9.64 ab 26.72 hy 2.92 an 21.41 ol 25.93 mt 1.86 il 3.19 ap 1.01	Nakamura Bay, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sci. Rep. Toho. Un. (2), I, p. 51, 1913.	Basalt.	
146	III.5.3.4.⊙ 2.3.2.3.	or 8.34 di 12.89 ab 25.15 hy 5.18 an 21.13 ol 15.91 mt 2.73 il 5.32 ap 1.68	Daimanji Yama, Dogo, Oki Islands, Japan.	K. Yokoyama.	S. Kozu, Sci. Rep. Toho. Un. (2), I, p. 51, 1913.	Basalt.	SiO ₂ given as 47.45. Corr. by S. K.
147	III''5(6)''3(3)4. 2.2''2.2.	or 11.68 di 26.64 ab 11.53 ol 12.69 an 12.51 mt 8.82 ne 4.83 il 4.71 ap 3.36	Agusowami, Iwami, Japan.	K. Yokoyama.	S. Kozu, pers. com.	Limburgite.	
148	(II)III''5.3''''4. 2.1.2.3.	Q 4.98 di 16.40 or 10.56 hy 11.80 ab 22.01 mt 2.55 an 22.52 il 7.30	Tchang-li, East Yunnan, China.	Pisani.	J. Deprat, Mem. Sv. G. Ind. Ch., I (1), 1, p. 235, 1912.	Basalt.	
149	III.5.3''4. 2.2.2.3.	or 9.45 di 11.16 ab 22.01 hy 16.73 an 21.68 ol 5.01 mt 3.25 il 6.99 ap 1.01	Bet. Ta-tzen and Chou-kou, East Yunnan, China.	Pisani.	J. Deprat, Mem. Sv. G. Ind. Ch., I (1), 1, p. 233, 1912.	Basalt.	
150	III.5.3.4''. 2.1.2.3.	or 5.00 di 19.43 ab 26.20 hy 20.27 an 15.29 ol 5.63 il 3.71 ap 0.34	St. Thomas Mount, n. Madras, India.	H. S. Washing- ton.	H. S. Washington, A. J. S., XLI, p. 330, 1916.	Norite.	
151	(II)III(4)5''3.4''. 2.2.2.3.	Q 6.00 di 17.43 or 6.67 hy 9.46 ab 33.01 mt 5.30 an 15.57 il 4.56 ap 1.01	Springbrook, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Andesite.	H. C. Richards, pers. com.
152	III.5.3.4.⊙ 2.2.2.2.	or 8.34 di 14.74 ab 27.77 hy 12.40 an 15.29 ol 11.73 mt 3.48 il 4.26 ap 1.34	Toowoomba, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1912.	Olivine basalt.	H. C. Richards, pers. com.
153	III.5''3.4. 2.3.2.3.	or 10.56 di 16.38 ab 27.25 hy 5.24 an 14.18 ol 14.68 mt 5.34 il 2.58 ap 1.34	Pittsworth, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1912.	Basalt.	H. C. Richards, pers. com.
154	(II)III.5''3.4. 2.3.2.3.	or 9.45 di 13.24 ab 30.39 ol 17.43 an 16.68 mt 2.55 ne 1.14 il 4.41 ap 1.68	Mount Lindsay, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914.	Basalt.	H. C. Richards, pers. com.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
155	49.43	12.73	5.06	8.47	6.96	8.59	3.50	1.21	1.11	0.73	2.26	0.49	0.08	CO ₂ 0.28 ZrO ₂ none SO ₃ none Cl trace S trace Cr ₂ O ₃ trace NiO 0.05 BaO none SrO none Li ₂ O none	100.95	3.18
Al. I	.824	.125	.032	.118	.174	.154	.056	.013			.028	.003	.001		(100.89)	
156	55.05	14.15	1.80	5.31	8.07	9.36	2.82	0.72	1.46	0.22	0.57	0.06	0.22	CO ₂ 0.02 ZrO ₂ none SO ₃ 0.01 Cl 0.02 F none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.01 NiO none BaO none SrO trace CuO 0.01	99.89	2.814
Al. I	.918	.139	.011	.074	.202	.157	.045	.008			.007	—	.003			
157	48.92	14.87	3.99	7.44	5.73	7.26	3.42	1.80	1.56	0.82	2.78	0.59	0.29	CO ₂ 0.09 ZrO ₂ none SO ₃ 0.08 Cl 0.02 S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.02 NiO 0.04 BaO 0.04 SrO trace Li ₂ O trace CuO 0.06	99.83	2.865
Al. I	.815	.146	.025	.103	.143	.130	.055	.019			.035	.004	.004			
158	48.39	13.36	5.80	6.48	4.57	8.90	3.61	1.18	1.57	1.33	3.74	3.63	3.36	CO ₂ 0.05 ZrO ₂ none SO ₃ trace Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ none NiO 0.01 BaO 0.06 SrO trace Li ₂ O none	100.04	2.799
Al. I	.807	.131	.036	.090	.114	.159	.058	.013			.046	.004	.005			
159	46.26	13.36	2.34	10.53	8.87	9.18	3.27	1.23	2.08	0.15	1.78	0.42	0.12	CO ₂ 0.06 ZrO ₂ none SO ₃ 0.13 Cl 0.01 F none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.03 NiO 0.01 BaO 0.05 SrO trace	99.90	2.947
Al. I	.771	.131	.015	.146	.222	.164	.053	.013			.022	.003	.002			
160	46.51	15.27	2.50	8.92	8.40	9.12	3.12	1.17	1.21	0.22	2.20	0.33	0.05	CO ₂ 0.61 SO ₃ 0.11 Cl 0.04 Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.03 NiO 0.03 BaO 0.04 SrO trace Li ₂ O trace CuO trace	99.90	3.014
Al. I	.775	.150	.016	.124	.210	.163	.050	.012			.028	.002	—			
161	45.06	14.60	2.60	9.00	9.64	9.86	2.90	0.85	2.73	0.55	1.55	0.61	0.19	CO ₂ 0.05 ZrO ₂ none SO ₃ none Cl none S none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.02 NiO none BaO trace Li ₂ O none	100.23	2.911
Al. I	.751	.143	.016	.125	.241	.176	.047	.009			.019	.004	.003			
162	46.20	17.44	1.30	9.54	7.38	9.02	3.69	1.10	2.11	0.09	1.30	0.56	0.17	CO ₂ 0.04 ZrO ₂ none SO ₃ none Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ trace NiO none BaO 0.03 SrO none Cu none	99.97	2.934
Al. I	.770	.171	.008	.132	.185	.161	.060	.012			.016	.004	.002			
163	52.01	13.50	6.25	4.82	8.48	7.81	2.74	1.17	0.67	0.24	2.20	0.39	0.07	CO ₂ none SO ₃ none Cl trace NiO 0.03 Li ₂ O trace	100.38	2.867
A2. II	.867	.132	.039	.067	.212	.139	.044	.013			.028	.003	.001			
164	51.72	13.36	2.80	8.16	7.20	7.68	2.87	1.34	0.96	1.61	2.30	0.25	trace	SO ₃ none Cl trace Li ₂ O none	100.25	2.828
A2. II	.862	.131	.018	.114	.180	.138	.047	.015			.029	.002	—			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
155	III.5.3.4.⊙ 2.1.2.3.	or 7.23 di 19.71 ab 29.34 hy 10.70 an 15.57 ol 3.60 mt 7.42 il 4.26 ap 1.01	Yandina, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 169, 1906.	Basalt.	
156	''III.''5.3(4).4(5). 1.1.2.2.	Q 5.16 di 18.08 or 4.45 hy 19.31 ab 23.58 mt 2.55 an 23.91 il 1.06	Bakers Creek, New England, New South Wales.	J. C. H. Min- gay.	E. C. Andrews, Rec. G. S. N. S. W., VIII (3), p. 214, 1907.	Diorite.	
157	(II)III.5.3.4. 2.1.2.3.	or 10.56 di 10.07 ab 28.82 hy 14.36 an 20.02 ol 0.93 mt 5.80 il 5.32 ap 1.34	Canobolas Mountains, n. Orange, New South Wales.	J. C. H. Min- gay.	Mingaye and White, Rec. G. S. N. S. W., VII (4), p. 304, 1904.	Olivine basalt.	
158	(II)III.5.3.4. 3.1.2.3.	Q 3.18 di 18.57 or 7.23 hy 3.66 ab 30.39 mt 8.35 an 16.68 il 6.99 ap 1.34	Bong Bong Flow, Kiama, New South Wales.	H. P. White.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII (I), p. 23, 1905.	Basalt.	
159	III.5''3.4. 2.3.2.3.	or 7.23 di 20.18 ab 20.44 ol 19.67 an 18.07 mt 3.45 ne 3.98 il 3.34 ap 1.01	Reservoir quarry, Prospect, n. Sydney, New South Wales.	J. C. H. Min- gay.	Jensen and Jevons, Pr. R. Soc. N. S. W., XLV, p. 504, 1912.	Pallio- essexite.	
160	III.5.3.4.⊙ 2.3.2.2.	or 6.67 di 15.51 ab 23.58 ol 17.42 an 24.46 mt 3.71 ne 1.42 il 4.26 ap 0.67	Camden Park, Sydney, New South Wales.	J. C. H. Min- gay.	G. W. Card in Mingaye and White, Rec. G. S. N. S. W., VII (3), p. 230, 1903.	Olivine basalt.	
161	III.5.3(4).4''. 2.3.2.2.	or 5.00 di 17.09 ab 19.39 ol 20.36 an 24.19 mt 3.71 ne 2.84 il 2.89 ap 1.34	Cooma District, New South Wales.	Not stated.	A. R. Dep. Min. N. S. W. (1909), p. 198, 1910.	Olivine basalt.	
162	(II)III.5''3''A''. 1(2).(3)4.''2.''3.	or 6.67 di 11.16 ab 20.96 ol 20.16 an 27.52 mt 1.86 ne 5.68 H 2.43 ap 1.34	Wanyambilli, New South Wales.	H. P. White.	N. S. W. Dep. Min. A. R. (1912), p. 198, 1913.	Olivine dolerite.	
163	''III.(4)5.3''4. 2.1.2.2.	Q 6.54 di 11.66 or 7.23 hy 15.80 ab 23.06 mt 9.05 an 20.85 il 4.26 ap 1.01	Hay Hill, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, Vict. G. S. B. 24, p. 35, 1912.	Andesitic basalt.	
164	III.5.3.4.⊙ 2.1.2.3.	Q 2.58 di 13.93 or 8.34 hy 20.10 ab 24.63 mt 4.18 an 19.18 il 4.41 ap 0.67	Jim Jim, Macedon, Victoria.	R. J. Lewis.	Skeats and Summers, Vict. G. S. B. 24, p. 33, 1912.	Anorthoclase basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
165	45.10	12.86	5.66	7.10	8.56	9.10	3.99	1.02	1.53	1.10	3.50	1.00	0.08	CO ₂ SO ₃ Cl Li ₂ O	trace none trace none	100.60	2.854
A2. II	.752	.126	.036	.044	.214	.163	.065	.011			.044	.007	.001				
166	43.24	13.19	4.42	8.46	8.48	9.32	2.28	1.68	2.46	2.03	3.15	1.13	0.18	CO ₂ SO ₃ Cl Li ₂ O	trace none trace none	100.02	2.901
A2. II	.721	.129	.028	.118	.212	.166	.037	.018			.039	.008	.003				
167	43.82	12.90	6.74	6.25	9.32	9.44	2.49	1.75	1.70	1.26	3.50	1.02	0.37	CO ₂ SO ₃ Cl Li ₂ O	trace none trace none	100.56	2.995
A2. II	.730	.126	.042	.087	.233	.169	.040	.019			.044	.007	.005				
168	50.53	15.13	5.28	5.68	7.59	8.41	3.26	0.94	0.63	0.76	1.70	0.35	0.10	CO ₂ SO ₃ Cl NiO	none none trace 0.02	100.36	2.922
A2. II	.842	.148	.033	.079	.190	.150	.053	.010			.021	.002	.001				
169	49.29	13.99	7.54	4.49	8.82	8.28	2.97	1.04	0.69	0.79	1.75	0.38	0.15	CO ₂ SO ₃ Cl NiO	none none trace 0.06	100.24	2.895
A2. II	.822	.137	.047	.062	.221	.148	.048	.011			.022	.003	.002				
170	46.29	13.71	3.03	9.14	9.50	8.60	3.26	1.62	0.39	0.31	2.95	0.71	0.14	CO ₂ SO ₃ Cl Cr ₂ O ₃ NiO	trace trace trace 0.05 0.01	99.71	2.959
A2. II	.772	.134	.019	.127	.238	.154	.053	.017			.037	.005	.002				
171	45.15	12.93	5.26	6.88	11.35	9.97	2.90	1.76	0.32	0.29	2.65	0.73	0.16	CO ₂ NiO	none 0.01	100.36	2.914
A2. II	.753	.127	.033	.096	.284	.179	.047	.019			.033	.005	.002				
172	50.44	14.47	6.32	5.01	7.93	8.75	2.59	1.11	0.60	0.60	1.80	0.31	0.19	CO ₂ SO ₃ Cl NiO	none none none 0.01	100.13	
A2. II	.841	.142	.039	.069	.198	.156	.042	.012			.023	.002	.003				
173	45.56	13.32	2.30	9.68	11.12	8.77	3.02	1.53	1.28	0.27	3.00	0.71	0.19	CO ₂ SO ₃ Cl Cr ₂ O ₃ NiO	none none 0.05 0.06 0.01	100.87	2.994
A1. I	.759	.130	.014	.135	.278	.157	.048	.016			.038	.005	.003				
174	44.95	15.50	2.04	10.47	7.43	8.24	3.04	1.98	2.60	0.52	2.77	0.52	0.21	CO ₂	0.18	100.45	2.91
A2. II	.749	.152	.013	.146	.186	.147	.049	.021			.035	.004	.003				
175	51.93	14.26	2.49	10.76	5.28	7.89	2.79	0.81	1.13	0.09	1.75	0.31	0.57	CO ₂ FeS ₂	none 0.15	100.21	
A2. II	.806	.140	.016	.150	.132	.141	.045	.009			.022	.002	.008				
176	49.27	13.57	2.47	12.78	4.26	8.51	2.44	1.42	0.55	0.22	2.13	1.23	0.50	CO ₂ ZrO ₂ FeS ₂ V ₂ O ₅ BaO	0.10 none 0.15 0.09 none	99.69	2.99
A1. I	.821	.133	.016	.178	.107	.152	.039	.015			.027	.008	.007				
177	49.80	13.76	3.09	11.97	5.02	10.25	3.00	1.15	trace		0.95	0.22	0.10				99.31
B2. III	.830	.135	.019	.167	.126	.183	.048	.013			.012	.002	.001				
178	49.74	12.36	1.64	10.08	8.83	10.88	2.45	0.55	0.17	0.05	2.49	0.41	0.14	CO ₂ ZrO ₂ SO ₃ Cl S Cr ₂ O ₃ V ₂ O ₅ MoO ₃ Ce ₂ O ₃ NiO BaO SrO CuO	none trace trace 0.10 0.04 0.04 0.02 0.01 trace 0.05 trace 0.07 none	100.12	
A1. I	.829	.121	.010	.140	.221	.195	.040	.006			.031	.003	.002				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
165	III.5(6).3(4).4(5). 2.2.2.2.	or 6.12 di 24.41 ab 23.58 ol 7.07 an 13.90 mt 0.23 ne 5.68 il 10.21 hm 5.60 ap 2.35	Woodend, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, Vict. G. S. B. 24, p. 28, 1912.	Limburgite.	
166	III.5.3."4. 2.3.2.2.	or 10.01 di 14.46 ab 19.39 hy 2.46 an 20.57 ol 13.47 mt 6.50 il 5.93 ap 2.69	Woodend, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, Vict. G. S. B. 24, p. 28, 1912.	Limburgite.	
167	III.5.3."4. 3.3.2.2.	or 10.56 di 17.12 ab 20.96 hy 0.80 an 18.63 ol 10.77 mt 9.74 il 6.69 ap 2.35	King's quarry, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, Vict. G. S. B. 24, p. 28, 1912.	Limburgite.	
168	"III.5.3""4". 2.1.2.2.	Q 1.20 di 12.75 or 5.56 hy 16.41 ab 27.77 mt 7.66 an 23.63 il 3.19 ap 0.67	Marida Yallock, Camperdown District, Victoria.	A. G. Hall.	H. J. Grayson, Vict. G. S. Mem. No. 9, p. 22, 1910.	Basalt.	
169	III.5.3""4". 2.1.2.2.	Q 1.26 di 15.12 or 6.12 hy 15.10 ab 25.15 mt 9.74 an 21.68 il 3.34 hm 0.80 ap 0.11	Kolara, Camperdown District, Victoria.	A. G. Hall.	H. J. Grayson, Vict. G. S. Mem. No. 9, p. 22, 1910.	Basalt.	
170	III.5.3.4.⊙ 2.3.2.2.	or 9.45 di 15.63 ab 22.01 ol 18.67 an 18.63 mt 4.41 ne 3.12 il 5.62 ap 1.68	Camperdown, Victoria.	A. G. Hall.	H. J. Grayson, Vict. G. S. Mem. No. 9, p. 22, 1910.	Basalt.	
171	III.5(6).3.4. 2.3.2.2.	or 10.56 di 22.14 ab 14.67 ol 15.75 an 16.96 mt 7.66 ne 5.40 il 5.02 ap 1.68	Mount Terang, Camperdown District, Victoria.	A. A. Topp.	H. J. Grayson, Vict. G. S. Mem. No. 9, p. 22, 1910.	Basalt.	
172	"III."5.3(4).4. 2.1.2.2.	Q 4.32 di 13.28 or 6.67 hy 14.92 ab 22.01 mt 9.05 an 24.46 il 3.50 ap 0.67	Warrnambool, Victoria.	Not stated.	A. R. Sec. Min. Vict. (1910), p. 64, 1911.	Basalt.	
173	III.5""3.4. 2.3.2.2.	or 8.90 di 16.56 ab 18.60 ol 22.48 an 18.35 mt 3.25 ne 3.55 il 5.78 ap 1.68	Balwyn, n. Doncaster, Victoria.	F. Chapman.	Chapman and Thiels, Pr. R. Soc. Vict., XXIV (1), p. 133, 1911.	Limburgite.	
174	"III.5""3.4. 2.3.2.3.	or 11.68 di 11.81 ab 18.34 ol 19.11 an 22.80 mt 3.02 ne 3.98 il 5.32 ap 1.34	Tullamarine, Bourke County, Victoria.	F. L. Stilwell.	F. L. Stilwell. Pr. R. Soc. Vict., XXIV (1), p. 177, 1911.	Basalt.	
175	"III."5.3(4).4". 2.1.2.3.	Q 4.20 di 11.11 or 5.00 hy 23.50 ab 23.58 mt 3.71 an 23.91 il 3.34 ap 0.67	Secret Creek, Ashburton Goldfield, West Australia.	Not stated.	J. A. Thompson in A. G. Maitland, W. Aust. G. S. B. 33, p. 164, 1909.	Quartz dolerite.	
176	III.5.3""4. "2.1.2.(3).4.	Q 2.64 di 10.77 or 8.34 hy 24.01 ab 20.44 mt 3.71 an 21.96 il 4.10 ap 2.69	Mount Holmes, West Australia.	Surv. lab.	R. A. Farquaharson, W. Aust. G. S. B. 43, p. 49, 1912.	Quartz dolerite.	
177	III.5.3.4.⊙ 2.2.2.3.	or 7.23 di 23.73 ab 25.15 hy 7.36 an 20.57 ol 8.49 mt 4.41 il 1.82 ap 0.67	Crater, Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 141, 1888.	Basalt.	In W. T., p. 325.
178	III.5.3(4).4. 2.1.2.3.	or 3.34 di 24.78 ab 20.96 hy 17.00 an 20.85 ol 4.67 mt 2.32 il 4.71 ap 1.01	Halemaumau, Kilauea, Hawaii, Hawaiian Islands.	J. B. Ferguson.	Day and Shepherd, B. G. S. A., XXIV, p. 586, 1913.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
179	45.96	10.94	5.85	6.39	10.82	9.96	2.40	1.92	0.36	0.12	5.50	trace	0.08	CO ₂ none NiO 0.02	100.32	
A2. II	.766	.107	.037	.089	.271	.178	.039	.020			.069	—	.001			
180	44.26	13.32	4.60	8.19	9.42	10.95	2.40	0.99	0.37		5.02	0.45			99.97	
A2. II	.738	.131	.029	.114	.236	.196	.039	.011			.063	.003				
181	46.36	16.70	7.53	6.23	5.84	9.77	3.22	1.12	0.35		1.88	0.58			99.58	
A2. II	.773	.164	.047	.086	.146	.175	.052	.012			.024	.004				
182	44.71	11.24	5.48	8.21	14.32	10.22	2.50	1.01	0.21		2.00	0.37			100.27	
A2. II	.745	.110	.034	.114	.358	.182	.040	.011			.025	.003				
183	49.44	11.38	2.41	12.53	12.26	7.30	2.91	1.19	trace	0.12	0.72	0.12	0.32		100.70	
A2. II	.824	.111	.015	.174	.307	.130	.047	.013			.009	.001	.005			
184	47.20	15.29	9.57	6.13	5.90	8.93	3.61	0.85	1.12		1.14	0.46			100.20	
A2. II	.787	.150	.060	.085	.148	.159	.058	.009			.014	.003				
185	50.22	16.20	3.13	8.07	7.54	8.57	3.36	1.38	0.22		1.95		trace		100.64	2.79
A3. III	.837	.159	.019	.112	.189	.153	.054	.015			.024		—			
186	48.97	16.12	1.90	9.63	7.64	8.73	2.99	1.21	1.39		1.62		trace		100.20	2.89
A3. III	.816	.158	.012	.134	.191	.155	.048	.013			.020		—			

RANG 3. ALKALICALCIC. CAMPTONASE.

1	44.97	15.76	4.44	12.13	4.15	8.67	4.02	0.32	0.39		4.87	0.35	0.17		100.24	
A2. II	.750	.155	.028	.168	.104	.155	.065	.003			.061	.002	.002			
2	50.36	14.57	2.48	8.31	7.62	11.13	3.04	0.44	0.78		1.70		0.46	Cr ₂ O ₃ trace	100.89	3.04
A2. III	.839	.143	.016	.115	.191	.198	.049	.005			.021		.007			
3	51.77	14.59	3.62	6.90	7.18	7.79	3.92	0.64	1.85	0.46	1.13	0.18	0.05		100.08	2.91
B2. II	.863	.143	.023	.096	.180	.139	.063	.007			.014	.001	.001			
4	49.71	13.66	5.49	9.51	6.13	5.85	4.51	0.37	2.66	0.48	1.53	0.10	0.13		100.13	2.91
A2. II	.829	.134	.034	.132	.153	.105	.073	.004			.019	.001	.002			
5	49.09	15.11	0.48	7.85	7.66	11.03	3.24	0.37	0.39	0.02	3.40	0.34	0.25	CO ₂ none ZrO ₂ none S 0.06 Cr ₂ O ₃ 0.04 BaO none	99.33	
B1. II	.818	.148	.003	.109	.192	.196	.052	.004			.043	.002	.004			
6	53.06	12.83	1.20	5.10	7.50	13.71	3.56	0.05	2.16	0.16	0.42	trace	0.16	CO ₂ 0.25 S trace Cr ₂ O ₃ 0.06 NiO trace BaO none SrO none	100.22	
A1. I	.894	.126	.008	.071	.188	.245	.057	—			.005	—	.002			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 4. DOSODIC. CAMPTONOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
179	III.5.3."4. 2.2.2.2.	or 11.12 di 28.08 ab 18.34 ol 9.94 an 13.34 mt 4.64 ne 1.14 il 10.49 hm 2.72	Malaiola, Savaii, Samoa.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 706, 1908.	Olivine. basalt.	
180	III.5.3(4).4. 2.2.2.2.	or 6.12 di 22.97 ab 18.86 ol 11.12 an 22.52 mt 6.73 ne 0.85 il 9.58 ap 1.01	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 110, 1910.	Microgabbro.	
181	(II)III.5.3(4).4. 3.2.2.2.	or 6.67 di 13.58 ab 27.25 hy 3.20 an 27.80 ol 4.95 mt 10.90 il 3.65 ap 1.34	Drygalski, Mountain, Heard Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (3), p. 258, 1908.	Basalt.	
182	III(IV).5(6).3.4. 2.3.2.2.	or 6.12 di 24.89 ab 13.36 ol 22.89 an 16.40 mt 7.59 ne 4.12 il 3.80 ap 1.01	Heard Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (3), p. 258, 1908.	Basalt.	
183	III.5.3.4.⊙ 1.3.2.2.	or 7.23 di 17.25 ab 24.63 hy 3.78 an 14.18 ol 28.38 mt 3.48 il 1.37 ap 0.34	Carnley Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islds., p. 722, 1909.	Gabbro.	
184	"III.5.3.4(5). 3.1.2.2.	or 5.00 di 14.39 ab 30.39 hy 8.26 an 23.07 ol 0.90 mt 13.92 il 2.13 ap 1.01	Philippi Lake, Kerguelon Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (2), p. 218, 1908.	Dolerite.	
185	(II)III.5.3"4. 2.3.2.2.	or 8.34 di 14.40 ab 28.30 hy 4.45 an 24.74 ol 11.89 mt 4.64 il 3.65	Cockburn Island, W. Antarctica.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 89, 1899.	Basalt glass.	Crust of No. 183. In W. T., p. 325.
186	(II)III.5.3(4).4. 3.3.2.3.	or 7.23 di 13.17 ab 25.15 hy 5.01 an 26.97 ol 15.41 mt 2.78 il 3.04	Cockburn Island, W. Antarctica.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 89, 1899.	Basalt.	In W. T., p. 325.

SUBBRANG 5. PERSODIC. ORNOSE. (C. I. P. W., 1902.)

1	(II)III.5.3.5. 3.3.2.3.	or 1.67 di 13.95 ab 31.44 ol 9.18 an 24.19 mt 6.50 ne 1.42 il 9.27 ap 0.67	Skreia, Havnefjord, Jones Sound, Ellesmere Land.	P. Schei.	C. Bugge, Rep. 2 Fram. Exp., No. 22, p. 37, 1910.	Diorite porphyry.	
2	III.5.3(4).(4)5. 2.2.2.3.	or 2.78 di 24.66 ab 25.68 hy 8.67 an 24.74 ol 6.99 mt 3.71 il 3.19	Maltby Park, New Haven, Connecticut.	G. W. Hawes.	G. W. Hawes, A. J. S., XI, p. 123, 1876.	Meta- dolerite.	Not in W. T.
3	"III.5.3."5. 2.1.2.2.	or 3.89 di 14.77 ab 33.01 hy 16.88 an 20.29 ol 1.39 mt 5.34 il 2.13 ap 0.34	Hartshorn's quarry, Springfield, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 159, 1908.	Basalt.	
4	"III.5."3.5. 2.2.2.3.	or 2.22 di 10.23 ab 38.25 hy 15.20 an 15.85 ol 4.22 mt 7.89 il 2.89 ap 0.34	Millington, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 159, 1908.	Basalt.	
5	III.5.3(4).5. 2.2.2.2.	or 2.22 di 21.72 ab 27.25 hy 4.65 an 25.58 ol 9.02 mt 0.70 il 6.54 ap 0.67	Ortiz Mountains, New Mexico.	M. W. Adams.	I. H. Ogilvie, J. G., XVI, p. 236, 1908.	Andesite.	
6	III.5.3.5.⊙ 1.1.4.2.	ab 29.87 di 39.36 an 19.18 hy 3.46 ol 3.12 mt 1.86 il 0.76	Sawtooth Rock, Fort Orford quadrangle, Oregon.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	51.01	11.89	1.57	6.08	8.87	10.36	4.17	0.15	2.09	0.24	0.98	0.17	trace	FeS ₂ 1.73 CuS trace	99.35	
2A. II	.850	.117	.010	.085	.222	.185	.068	.002			.012	.001	—			
8	46.11	15.97	3.31	9.16	8.35	8.49	3.42	0.63	1.99		0.54	0.47	0.65		99.09	
B2. III	.769	.156	.021	.127	.209	.152	.055	.007			.007	.003	.009		(99.10)	
9	52.39	15.08	4.42	8.04	4.42	8.53	4.45	0.28	0.38	0.23	1.16	0.36		CO ₂ 0.28	100.02	
A3. III	.873	.148	0.23	.112	.111	.152	.072	.003			.015	.003				
10	44.87	13.60	5.65	5.68	9.39	11.05	3.41	0.45	2.05	1.48	2.13				100.08	
A3. III	.748	.133	.036	.079	.235	.197	.055	.005			.027					
11	52.44	14.23	2.78	7.05	7.40	6.71	3.25	0.65	0.50	2.03	2.09	0.13		CO ₂ 0.25 SO ₄ 0.04	99.55	
A2. II	.874	.140	.018	.098	.185	.120	.053	.007			.026	.001				
12	53.52	13.56	4.93	6.61	7.37	7.39	3.22	0.68	1.03		1.84				100.05	
A3. III	.892	.133	.031	.092	.184	.132	.051	.007			.023					
13	52.39	15.08	4.42	8.04	8.53	4.42	4.45	0.28	0.38	0.23	1.16	0.36		CO ₂ 0.28	100.02	
A2. II	.873	.148	.028	.112	.213	.079	.072	.003			.015	.002				
14	50.05	14.22	4.81	8.72	5.71	9.01	4.24	0.43	0.35	0.19	1.67	0.26		CO ₂ 0.23	99.89	
A2. II	.834	.139	.030	.121	.143	.161	.068	.005			.021	.002				
15	48.60	16.38	3.01	9.65	6.04	10.18	2.71	0.53	0.59	0.11	1.43	0.12		CO ₂ 0.12 FeS ₂ 0.21	99.68	
A2. II	.810	.162	.019	.134	.151	.182	.044	.006			.018	.001				
16	51.41	13.70	4.36	6.08	6.43	11.61	3.88	0.55	1.89		0.88				100.79	
A3. III	.857	.134	.028	.085	.161	.207	.063	.006			.011					
17	50.22	14.96	2.54	10.31	7.16	7.90	3.92	0.58	0.73		1.85	0.08	0.09		100.34	
A2. II	.837		.016	.143	.179	.141	.063	.006			.023	—	.001			
18	50.19	16.00	5.07	5.81	5.55	10.87	3.44	0.46	2.38		1.06				100.83	
A3. III	.837	.157	.032	.081	.139	.195	.055	.005			.013					
19	50.19	13.93	2.13	9.68	10.13	7.29	3.84	0.31	0.82		1.74	0.11	0.37		100.54	
A2. II	.837	.137	.013	.135	.253	.130	.062	.003			.022	.001	.005			
20	49.44	15.38	7.26	5.07	8.14	7.75	3.51	0.44	2.02		1.40	0.14	0.11		100.66	
A2. II	.824	.151	.046	.071	.204	.139	.056	.005			.018	.001	.002			
21	49.16	14.15	5.03	6.68	6.95	9.12	3.94	0.48	1.42		1.82	0.29	0.48		99.52	
A2. II	.819	.139	.031	.093	.174	.163	.064	.005			.023	.002	.007			
22	46.52	15.02	4.05	5.91	11.85	8.85	4.01	0.49	1.13		1.90	0.24	0.52		100.49	
A2. II	.775	.147	.025	.082	.298	.158	.065	.005			.024	.002	.007			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 5. PERSODIC. ORNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	III.5.(2)3.5. 2.2.2.2.	or 1.12 di 30.12 ab 34.58 ol 11.56 an 13.07 mt 2.32 ne 0.57 il 1.82 ap 0.34 pr 1.73	Grass Valley, Nevada County, California.	H. N. Stokes.	W. Lindgren, U. S. G. S. A. R. 17, (II), p. 66, 1896.	Diabase.	
8	"III.5.3(4).(4)5. 2.4.2.2.	or 3.89 di 10.88 ab 25.94 ol 21.77 an 26.13 mt 4.87 ne 1.56 il 1.06 ap 1.01	Ornö, Sweden.	R. Mauzelius.	A. Cederström, G. F. F., XV, p. 108, 1893.	Ornoite.	In W. T., p. 327.
9	(II)III.5.3.5. 2.1.2.3.	Q 1.68 di 15.73 or 1.67 hy 12.48 ab 37.73 mt 6.50 an 20.29 il 2.28 ap 1.01	Heppenheim, Kirschhäusertal, Odenwald.	K. M. Jene.	G. Klemm, Nb. Ver. Erdk., (4), XXVIII, p. 25, 1907.	Diabase.	
10	III.5(6)3."5. 2.2.2.2.	or 2.78 di 27.26 ab 19.39 ol 9.08 an 20.29 mt 8.35 ne 5.11 il 4.10	Wiebel, n. Steinbach, Giessen, Hesse.	A. Streng.	W. Schottler, Abh. G. L.-A. Darm., IV, (3), p. 458, 1908.	Basalt.	
11	(II)III."5.3"(4)5.	Q 4.68 di 8.25 or 3.89 hy 22.04 ab 27.77 mt 4.18 an 22.24 il 3.95 ap 0.34	Dorf Gill, Giessen, Hesse.	Surv. lab.	W. Schottler, Erl. G. Kt. Hes., Bl. Giessen, p. 84, 1913.	Trapp.	
12	"III.(4)5.3"(."5).	Q 6.90 di 12.63 or 3.89 hy 17.40 ab 26.72 mt 7.19 an 20.85 il 3.50	Londorf, Vogelsberg, Hesse.	A. Streng.	A. Streng, N. J., 1888, II, p. 217.	Vitro- dolerite.	In W. T., p. 327.
13	"III.5.3.5. 2.1.1.2.	or 1.67 hy 29.34 ab 37.73 ol 0.76 an 20.29 mt 6.50 il 2.28 ap 0.67	West border of Blatt Rossdorf, Hesse.	K. M. Jene.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 24, 1912.	Diabase.	
14	"III.5.3."5. 2.2.2.3.	or 2.78 di 19.94 ab 35.63 hy 5.54 an 18.35 ol 6.12 mt 6.96 il 3.19 ap 0.67	Kahleberg, n. Darmstadt, Hesse.	K. M. Jene.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 24, 1912.	Diabase.	
15	"III.5.3."5. 2.2.2.3.	or 3.34 di 15.33 ab 23.06 hy 13.87 an 31.14 ol 4.73 mt 4.41 il 2.74 ap 0.34	Ober Ramstadt, n. Darmstadt, Hesse.	K. M. Jene.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 38, 1912.	Diorite.	
16	III.5.3."5. 2.2.2.2.	or 3.34 di 31.69 ab 32.49 ol 5.00 an 18.07 mt 6.50 ne 0.28 il 1.67	Kohlhau, Lausitz.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 37, 1902.	Diabase.	
17	"III.5.3."5. 2.3.2.3.	or 3.34 di 14.35 ab 33.01 hy 6.84 an 21.68 ol 13.09 mt 3.71 il 3.50	Neusalza, Lausitz.	M. Voigt.	M. Voigt, In Diss. Leip., p. 18, 1906.	Norite.	
18	(II)III.5.3(4)."5. 2.1.2.2.	Q 0.60 di 21.81 or 2.78 hy 8.21 ab 28.82 mt 7.42 an 26.97 il 1.98	Warmisdorf, Lausitz.	R. Reinisch.	R. Reinisch, Hab. Schr., p. 37, 1902.	Diabase.	
19	III.5.3.5.⊙ 2.3.2.2.	or 1.67 di 12.49 ab 32.49 hy 9.07 an 20.20 ol 17.38 mt 3.02 il 3.34 ap 0.34	Gerstenberg, Lausitz.	M. Voigt.	M. Voigt, In. Diss. Leip., p. 18, 1906.	Olivine norite.	
20	"III.5.3(4)."5. 2.1.2.2.	Q 1.14 di 10.00 or 2.78 hy 16.92 ab 29.34 mt 10.67 an 25.02 il 2.74 ap 0.34	Durhennersdorf, Lausitz.	M. Voigt.	M. Voigt, In. Diss. Leip., p. 37, 1906.	Diorite.	
21	"III.5.3."5. 2.2.2.2.	or 2.78 di 20.70 ab 33.54 hy 3.32 an 19.46 ol 7.36 mt 7.19	Nieder Guhrig, Lausitz.	M. Voigt.	M. Voigt, In. Diss. Leip., p. 25, 1906.	Olivine diabase.	
22	III.5(6)3."5. 2.3.2.2.	or 2.78 di 16.27 ab 23.84 ol 19.33 an 21.41 mt 6.03 ne 5.54 il 3.65 ap 0.67	Belmsdorf, Lausitz.	M. Voigt.	M. Voigt, In. Diss. Leip., p. 25, 1906.	Diabase.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
23	42.58	14.68	5.96	11.29	6.32	10.10	3.39	0.64	1.55		3.49	0.22	0.13		100.35	
A2 II	.710	.144	.038	.157	.158	.180	.055	.007			.044	.002	.002			
24	49.20	14.36	4.51	4.62	8.23	10.17	4.52	0.44	2.20		1.14				99.39	
A3. III	.820	.141	.028	.064	.206	.182	.073	.005			.014					
25	46.78	14.66	7.25	5.22	6.81	9.61	3.08	0.45	1.78		1.78	0.45			99.37	
B2. III	.776	.144	.046	.072	.170	.171	.050	.005			.022	.003				
26	46.53	15.17	9.99	8.55	5.05	8.71	3.47	0.34	0.50		1.48		trace		99.79	
A3. III	.776	.149	.063	.119	.126	.155	.056	.004			.019	—				
27	49.58	13.84	6.21	3.56	6.74	10.59	4.40	0.92	2.77	0.01	1.54				100.16	2.989
A3. III	.826	.136	.039	.050	.169	.188	.071	.010			.019					
28	48.71	15.17	4.52	7.88	5.34	8.60	4.27	0.98	1.41	0.20	2.67				99.75	2.98
A3. III	.812	.149	.028	.110	.134	.154	.069	.010			.033					
29	47.49	15.73	3.21	11.80	7.56	9.24	3.42	0.67	n. d.		0.54		0.08		100.04	
A2. II	.792	.154	.020	.164	.189	.164	.055	.007			.007		.005			
30	52.21	13.93	3.62	6.01	7.56	10.24	3.30	0.25	0.35		2.13				99.60	
A3. III	.870	.136	.023	.083	.189	.183	.053	.003			.027					
31	44.37	11.36	7.23	3.49	9.28	8.50	3.67	0.74	3.28	1.95	5.21	0.99		CO ₂ none	100.07	
A2. II	.740	.111	.045	.049	.232	.152	.060	.008			.065	.007				
32	53.20	10.74	3.50	4.68	12.09	10.88	2.43	0.20	1.72	0.12	0.18	0.03	0.61	CO ₂ trace S 0.01 Cr ₂ O ₃ 0.16	100.55	
A2. II	.887	.105	.022	.065	.303	.195	.039	.002			.002	—	.009			
33	47.19	12.88	11.30	5.42	6.15	9.62	3.55	0.79	1.92		0.44	0.29	0.18	S trace	99.73	2.978
A2. II	.787	.126	.071	.075	.154	.171	.057	.008			.006	.002	.003			
34	50.27	14.04	8.68	3.95	6.81	9.56	3.86	0.70	0.31	0.36	1.81	0.25	trace	CO ₂ trace	100.60	
A2. II	.838	.138	.054	.055	.170	.171	.062	.008			.023	.002	—			
35	48.51	14.05	2.40	10.35	6.05	8.00	4.51	0.67	3.12		2.96	0.13			100.75	
A2. II	.809	.138	.015	.144	.151	.143	.073	.007			.037	.001				
36	54.33	11.43	6.10	7.47	11.70	4.25	3.52	0.59	0.60		0.13	0.06			100.18	
A2. II	.906	.112	.038	.104	.293	.076	.056	.006			.002	—				
37	52.15	15.31	2.60	7.45	7.05	8.31	3.85	0.70	0.88		2.31	0.09			99.70	
A2. II	.869	.150	.016	.104	.176	.148	.062	.008			.027	—			(100.78)	
38	46.96	15.19	8.35	7.30	6.63	8.34	4.53	0.59	1.09		1.45	0.17	0.12		100.72	
A2. II	.783	.149	.052	.101	.166	.149	.073	.006			.018	.001	.002			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 5. PERSODIC. ORNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
23	III.5(6).3''(4)5. 2.2.2.2.	or 2.89 di 20.62 ab 18.34 ol 11.58 an 22.80 mt 8.82 ne 5.68 il 6.69 ap 0.67	Golentz, Lausitz.	M. Voigt.	M. Voigt, In. Diss. Leip., p. 39, 1906.	Camptonite.	
24	III.5''3''5. 2.2.2.2.	or 2.78 di 26.05 ab 29.34 ol 7.98 an 17.51 mt 6.50 ne 4.83 il 2.13	Tharandt, Saxony.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 38, 1902.	Diabase.	
25	''III.5.3(4)''5. 2.1.2.2.	or 2.78 di 15.61 ab 28.82 hy 8.66 an 24.74 ol 1.12 mt 10.67 il 3.34 ap 1.01	Toti Hegy, Lake Balaton, Comitát Zala, Hungary.	K. Emszt.	K. Emszt, Jb. Ung. G. A. (1904), p. 338, 1906.	Basalt.	3 decimals.
26	''III.5.3(4)''5. 3.1.2.3.	Q 0.54 di 14.74 or 2.22 hy 10.40 ab 29.34 mt 14.62 an 24.74 il 2.89	Rosztoka, Comitát Szepes, Hungary.	P. Rozloznsnik.	B. V. Horvarth, Jb. Ung. G. A. (1910), p. 368, 1912.	Grünstein (diabase).	
27	III.5''(2)3''5. 2.1.2.2.	or 5.56 di 28.94 ab 29.87 ol 2.45 an 15.29 mt 7.19 ne 3.98 il 2.89 hm 1.28	Piz Mondin, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 236, 1909.	Diabase.	
28	(II)III.5.3(4)5. 2.2.2.3.	or 5.56 di 18.97 ab 33.01 ol 8.69 an 19.46 mt 6.50 ne 1.70 il 5.02	Piz Tumbif, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Diorite.	
29	III.5.3(4)(4)5. 2.3.2.3.	or 3.89 di 16.54 ab 23.84 ol 21.58 an 25.53 mt 4.64 ne 2.60 il 1.06	Val Scala, Valtellina, Lombardy.	O. Hecker.	O. Hecker, N. J. B. B., XVII, p. 343, 1903.	Norite- gabbro.	
30	III.5.3''5. 2.1.2.2.	Q 2.94 di 22.73 or 1.67 hy 12.48 ab 27.77 mt 5.34 an 22.24 il 4.10	Monte Capanne, Elba Island.	P. Alvisi.	P. Alvisi, Mem. Soc. Tosc., XXVIII, p. 205, 1912.	Diorite.	
31	III.5(2)3(4)5. 3.2.2.2.	or 4.45 di 15.12 ab 31.44 hy 5.00 an 11.95 ol 7.84 il 7.45 hm 7.23 pf 2.18 ap 2.35	Monte Columbar- giu, n. Scano, Monte Ferru, Sardinia.	H. S. Washing- ton.	H. S. Washington, B. Soc. G. It., XXXIII, p. 153, 1914.	Ghizite, (biotite- analcite basalt).	Also in J. G., XXII, p. 748, 1914.
32	III''5.3(4)5. 1.1.2.2.	Q 1.74 di 28.91 or 1.11 hy 23.19 ab 20.44 mt 5.10 an 17.79 il 0.90	Chanema River, Samoyed Urals, Russia.	H. Backlund.	H. Backlund, Mem. Ac. Sci., St. P., XXVIII, No. 3, p. 24, 1912.	Spessartite.	
33	III.5.3(4)5. 3.1.2.2.	Q 1.02 di 22.28 or 4.45 hy 5.20 ab 29.87 mt 16.47 an 16.96 il 0.91 ap 0.67	Issatschki Hill, Poltawa, Russia.	J. Morozewicz.	J. Morozewicz, Mem. C. G. Russ., VII, p. 30, 1903.	Oligoclase diabase.	
34	''III.5.3(4)5. 2.1.2.2.	Q 0.96 di 20.74 or 4.45 hy 7.40 ab 32.49 mt 7.42 an 18.90 il 3.50 hm 3.52 ap 0.67	Bet. Ghadames and Tripoli, Tripoli.	E. Manasse.	E. Manasse, B. Soc. G. It., XXIV, p. 139, 1905.	Olivine basalt.	
35	''III.5.''3''5. 2.3.2.3.	or 3.89 di 18.70 ab 34.06 ol 13.22 an 16.12 mt 3.48 ne 2.27 il 5.62 ap 0.34	French Guinea.	Not stated. Pisani?	Lemoine and Chau- tard, B. Soc. G. Fr. (4), VIII, p. 35, 1908.	Diabase.	
36	III.5.3(4)5. 2.1.1.2.	Q 3.06 di 5.78 or 3.34 hy 34.69 ab 29.34 mt 8.82 an 13.90 il 0.30	Zoanlé, Ivory Coast.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 118, 1911.	Norite.	
37	(II)III.5.3(4)5. 2.1.2.2.	or 4.45 di 15.27 ab 32.49 hy 14.82 an 22.24 ol 2.50 mt 3.71 il 4.10	Pointe de Fanu, Cap Verde, Senegal.	Pisani.	J. Chantard, B. Soc. G. Fr. (4), VII, p. 437, 1907.	Dolerite.	
38	''III.5''3''5. 2.2.2.3.	or 3.34 di 16.84 ab 31.44 ol 9.25 an 19.46 mt 12.06 ne 3.69 il 2.74 ap 0.34	Marahano, Debaroa, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 125, 1909.	Olivine basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. CAMPTONASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
39	51.69	13.16	3.99	8.65	6.84	8.41	2.76	0.45	1.00	0.55	1.70	0.28	0.14		99.62	2.92
A2. II	.862	.129	.025	.120	.171	.150	.045	.005			.023	.002	.002			
40	52.70	14.27	1.48	11.07	6.38	8.23	3.15	0.23	0.12	0.24	0.83		0.18	CO ₂ 0.15 FeS ₂ 0.49	99.53	2.96
A2. II	.878	.140	.009	.154	.160	.146	.051	.002			.010		.003			
41	51.63	12.10	8.67	3.10	9.40	9.17	3.10	0.30	(0.33)	(0.47)	2.47	0.26	0.30	SO ₃ 0.07 S 0.03 Cr ₂ O ₃ trace CuO 0.48	101.08	
B2. III	.861	.119	.054	.043	.235	.163	.050	.003			.031	.002	.004			
42	49.88	13.79	9.65	2.61	6.12	9.59	3.30	0.17	(1.14)	(1.84)	3.97	0.26	0.67	SO ₃ 0.09 S 0.02 Cr ₂ O ₃ trace CuO 0.14	100.26	
A?2. III	.831	.135	.060	.036	.153	.171	.053	.002			.050	.002	.010			

RANG 4. DOCALCIC. AUVERGNASE. (C. I. P. W., 1902.)

1	49.94	16.13	1.11	6.38	9.14	12.82	0.37	1.38	1.45	0.20	0.58	0.37		FeS ₂ 0.14	100.01	
A?2. II	.832	.158	.007	.089	.229	.229	.006	.015			.007	.003				

RANG 4. DOCALCIC. AUVERGNASE.

1	49.58	16.37	1.73	11.55	5.37	10.26	2.14	1.05	0.44	0.14	1.00	0.03	0.17	Cl 0.25 S 0.05 Cr ₂ O ₃ none BaO trace SrO trace	100.13	
A2. II	.826	.160	.011	.161	.134	.183	.018	.011			.013	—	.002			
2	44.26	13.95	7.84	8.87	6.59	10.41	1.81	1.75	1.54	0.33	1.41	0.85	0.19	CO ₂ 0.33 ZrO ₂ none SO ₃ none Cl, F 0.13 S none NiO none BaO 0.03 SrO 0.03	100.32	3.074
A1. I	.738	.738	.049	.124	.165	.186	.029	.019			.018	.006	.003			
3	40.82	17.55	6.75	6.29	6.91	10.34	1.90	2.77	4.25		1.90	0.54	0.15		100.17	
A2. II	.680	.172	.043	.088	.173	.185	.031	.030			.024	.004	.002			
4	47.12	15.96	4.03	9.90	4.90	13.33	1.15	2.01	0.92		0.56	0.57			100.45	
A2. II	.785	.156	.025	.138	.123	.238	.019	.021			.007	.004				
5	44.14	15.22	3.55	7.59	12.91	10.75	1.86	1.78	0.02	0.11	1.38	0.41		CO ₂ 0.03 SO ₃ 0.22	99.97	
A2. II	.736	.149	.023	.106	.323	.192	.030	.019			.017	.003				
6	44.91	17.15	1.68	6.45	14.27	11.28	1.01	0.89	1.52	0.26	0.46				99.88	
A3. III	.749	.168	.011	.090	.357	.202	.016	.010			.006					
7	46.05	14.88	4.22	5.78	5.98	13.47	1.41	2.56	3.01	0.52	0.93	0.59	0.21	ZrO ₂ none Cl 0.09 F 0.03 S 0.04 Cr ₂ O ₃ none BaO 0.06 SrO 0.07	99.90	
A1. I	.768	.146	.026	.081	.150	.241	.023	.028			.012	.004	.003			
8	44.56	11.68	3.95	6.88	11.91	10.37	1.03	2.31	2.97	0.84	2.90	0.40	0.24	CO ₂ none Cl trace S 0.06 Cr ₂ O ₃ 0.09 NiO 0.01 BaO trace	100.20	2.895
A1. I	.743	.115	.025	.096	.298	.186	.016	.024			.036	.003	.003			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 5. PERSODIC. ORNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
39	III.(4)5.3(4).(4)5. 2.1.2.3.	Q 5.70 di 14.43 or 2.78 hy 19.86 ab 23.58 mt 5.80 an 21.96 il 3.50 ap 0.67	Bundamba, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1914	Basalt.	H. C. Richards, pers. com.
40	III.5.3(4).5. 1.1.2.3.	Q 1.74 di 13.60 or 1.11 hy 27.45 ab 26.72 mt 2.09 an 24.19 il 1.52	Southern Cross, Greenmount, West Australia.	C. G. Gibson?	C. G. Gibson, W. Aust. G. S. B. 17, p. 20, 1904.	Quartz diorite.	
41	III.(4)5.3.5. 2.1.2.2	Q 5.16 di 19.44 or 1.67 hy 14.50 ab 26.20 mt 3.71 an 18.35 il 4.71 hm 6.08 ap 0.67	Waianae, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Dried before analysis. Iron oxides? CuO? In W. T., p. 329.
42	"III.(4)5.3"5. 3.1.2.2.	Q 6.24 di 17.28 or 1.11 hy 7.30 ab 27.77 il 6.99 an 22.24 hm 9.65 tn 0.78 ap 0.67	Koolan Range, Waimea, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Dried before analysis. Iron oxides? CuO? In W. T., p. 329.

SUBRANG 1-2. PREPOTASSIC.

1	III.5.4(5).2. 1.1.2.2.	Q 2.64 di 18.12 or 8.34 hy 24.19 ab 3.14 mt 1.62 an 38.09 il 1.06 ap 1.01	Dilburg, Hesse.	K. M. Jene.	G. Klemm, Erl. G. Kt. Hes., Bl. Messel, p. 8, 1910.	Diorite.	
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SUBRANG 3. SODIPOTASSIC.

1	III.5.4.3(4). 1(2).1"2.3.	Q 3.42 di 14.38 or 6.12 hy 24.29 ab 9.43 mt 2.55 an 36.42 il 1.98	Grassy Portage Bay, Rainy Lake, Ontario.	M. F. Connor.	A. C. Lawson, Can. G. S. Mem. 40, p. 50, 1913.	Hornblende gabbro.	
2	III.5.(3)4.3(4). 2.2.2.3.	or 10.56 di 17.30 ab 15.20 hy 9.54 an 24.74 ol 4.71 mt 11.39 il 2.74 ap 2.02	Caribou, Boulder County, Colorado.	G. Steiger.	E. S. Bastin, U. S. G. S. rec. lab.	Gabbro.	
3	(II)III.5(6).(3)4.3. 3.3.2.2.	or 16.68 di 13.40 ab 3.41 ol 10.03 an 30.80 mt 9.98 ne 6.96 il 3.65 ap 1.34	Schriesheim, Odenwald.	M. Dittrich.	W. Salomon, Vh. Nh. Ver. Heid., VII, p. 650, 1904.	Diorite.	Fresh?
4	III.5.4.3.⊙ 2.1.2.3.	or 11.68 di 25.14 ab 9.96 hy 8.09 an 32.25 ol 4.20 mt 5.80 il 1.06 ap 1.34	Langenberg, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 32.	Basalt.	
5	III.5(6)''4.3(4). 2.3.2.2.	or 10.56 di 18.16 ab 5.76 ol 23.15 an 27.80 mt 5.34 ne 5.40 il 2.58 ap 1.01	Wetzenborn, Giessen, Hesse.	Stadler.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 458, 1908.	Basalt (limburgite).	
6	III.5.4''.3(4). 1.4.2.2.	or 5.56 di 13.28 ab 8.38 hy 0.83 an 39.48 ol 27.32 mt 2.55 il 0.91	Premier Mine, Elandsfontein, Pretoria, Transvaal.	M. Dittrich?	A. P. Wagner, Tr. G. Soc. S. Afr., XIV, p. 57, 1911.	Griquaite (garnet diopside rock).	Nodule in kimberlite. Igneous?
7	III.5.(3)4.3. 2.(1)2.(2)3.2(3).	or 15.57 di 29.72 ab 8.91 ol 4.89 an 26.41 mt 6.03 ne 1.70 il 1.82 ap 1.34	Pic de Maros, Celebes.	E. W. Morley.	Iddings and Morley, J. G., XXIII, p. 240, 1915.	Absarokite.	
8	III.5.(3)4.(2)3. 2.2.2.2.	or 13.34 di 22.17 ab 8.38 hy 6.96 an 20.85 ol 12.37 mt 5.80 il 5.47 ap 1.01	Euroa, Victoria.	D. L. Mahony.	A. R. Secy. Min. Vict. (1911), p. 62, 1912.	Limburgite.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9	49.10	16.11	0.60	10.62	7.43	11.76	1.04	1.06	0.50	0.20	1.20	0.09	0.21	CO ₂ 0.16 ZrO ₂ none Cl 0.22 S none Cr ₂ O ₃ 0.01 NiO 0.03 NiO 0.02 BaO none SrO trace ZnS 0.03	100.39	3.124
A1. I	.816	.158	.004	.147	.186	.210	.017	.012			.015	—	.003			
10	49.75	16.70	1.61	8.06	6.98	11.35	1.62	1.52	1.51		0.80		0.10	CO ₂ none	100.00	
A2. II	.829	.164	.010	.112	.175	.203	.026	.016			.010		.001			
11	47.44	11.81	1.58	9.44	12.30	12.32	1.12	1.09	0.70		1.25		0.39	CO ₂ 0.05 FeS ₂ 0.23 Cr ₂ O ₃ 0.20	99.92	
A2. II	.791	.116	.010	.131	.308	.220	.018	.012			.016		.006			
12	53.03	15.78	3.12	5.63	6.39	10.41	2.60	0.69	1.44		0.06	none	trace		99.15	
B2. III	.884	.155	.019	.078	.160	.186	.042	.007			—	—				

RANG 4. DOCALCIC. AUVERGNASE.

1	47.80	18.24	0.35	9.27	8.08	11.44	2.24	0.45	0.58		1.46	0.24	0.55		100.70	
A2. II	.797	.179	.002	.129	.202	.204	.036	.005			.018	.002	.008			
2	47.11	14.33	4.88	11.06	8.45	9.12	1.91	0.20	1.52		0.78	0.29	0.21	SO ₂ 0.53 Cl 0.09	100.58	
A2. II	.785	.140	.031	.154	.211	.163	.031	.002			.010	.002	.003			
3	50.69	16.11	0.70	7.05	8.20	12.09	1.78	0.78	1.65	0.16	0.53			S 0.07 NiO 0.11	99.92	
A3. III	.845	.158	.004	.098	.205	.216	.029	.008			.007				(99.82)	
4	49.58	16.37	1.73	11.55	5.37	10.26	2.14	1.05	0.44	0.14	1.00	0.03	0.17	Cl 0.25 S 0.05 Cr ₂ O ₃ none BaO trace SrO trace	100.13	
A1. I	.826	.160	.011	.161	.134	.183	.034	.011			.013	—	.002			
5	49.40	12.22	1.87	7.44	11.80	11.60	2.16	0.93	0.98	0.14	0.90	0.17	0.17	CO ₂ 0.25 Cl 0.13 S 0.10 Cr ₂ O ₃ 0.08 BaO 0.03 SrO 0.04	100.41	
A1. I	.823	.120	.012	.103	.295	.207	.035	.010			.011	.001	.002			
6	44.91	14.41	5.22	13.11	5.78	10.32	1.01	0.87	1.13		1.84			S 0.12 NiO 0.73	99.45	
A3. III	.749	.141	.033	.182	.145	.184	.016	.009			.023					
7	53.01	15.54	1.85	6.09	7.70	10.60	2.37	0.62	0.73	0.47	1.70	trace		CO ₂ none S trace	100.68	
A3. III	.884	.152	.012	.085	.193	.189	.039	.007			.021	—				
8	47.20	18.64	1.96	6.82	8.28	11.52	2.91	0.28	1.44		0.84				99.89	3.02
A3. III	.787	.182	.013	.094	.207	.205	.047	.003			.011					
9	46.29	17.16	2.57	9.87	7.79	12.04	2.21	0.16	0.51		1.21				99.81	3.06
A3. III	.772	.168	.016	.138	.195	.215	.035	.002			.014					
10	45.66	16.26	2.97	8.51	10.21	12.25	1.34	0.31	0.92		1.39				99.82	3.04
A3. III	.761	.159	.019	.118	.255	.219	.022	.003			.018					

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 3. SODIPOTASSIC—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	III.5.4''3''. 1.1.2.3.	or 6.67 di 18.56 ab 8.91 hy 23.35 an 35.86 ol 2.34 mt 0.93 il 2.28	Broken Hill, New South Wales.	Not stated.	A. R. Dep. Min N. S. W. (1909), p. 198, 1910.	Dolerite.	
10	''III.5.4.3(4). 1.1.2.3.	or 8.90 di 18.40 ab 13.52 hy 17.23 an 33.92 ol 2.59 mt 2.32 il 1.52	Taupo Bay, Whangaroa, New Zealand.	J. S. Maclaurin. rin.	Bell and Clarke, N. Z. G. S. B. 8, p. 77, 1909.	Diorite.	
11	III(IV) 5.4.3(4). 1.2.2.2.	or 6.67 di 30.09 ab 9.43 hy 6.13 an 23.91 ol 17.88 mt 2.32 il 2.43	Happy Creek, Kakapotihi River, Mikonui, New Zealand	J. S. Maclaurin.	P. G. Morgan, N. Z. G. S. B. 6, p. 141, 1908	Quartz diorite.	
12	(II)III''5''4.3(4). 1.1.2.2	Q 4.74 di 17.98 or 3.89 hy 15.08 ab 22.01 mt 4.41 an 29.47	Antwerp Island, W. Antarctica.	E. Zdarek.	A. Pelikan, Voy. Belg., V, Pet. Unt., I, p. 32, 1909.	Gabbro.	

SUBRANG 4-5. PRESODIC. AUVERGNOSE. (C. I. P. W., 1902.)

1	(II)III.5.4.(4)5. 1.3.2.3.	or 2.78 di 13.44 ab 18.86 hy 5.38 an 38.36 ol 17.30 mt 0.46 il 2.74 ap 0.67	Umanak Island, Nugsuaks Peninsula, Greenland.	W. C. Phalen.	W. C. Phalen, Smiths. Misc. Coll., XLV, p. 190, 1904.	Diorite.	
2	III.5.4.5.⊙ 2.1.1.3.	Q 0.18 di 11.12 or 1.11 hy 30.97 ab 16.24 mt 7.19 an 29.75 il 1.52 ap 0.67	Ovifak, Disko Island, Greenland.	T. Nicolau.	T. Nicolau, Medd. Grnl., XXIV, p. 232, 1900.	Basalt.	Not in W. T.
3	III.5.4.4.⊙ 1.1.2.2.	or 4.45 di 21.42 ab 15.20 hy 20.26 an 33.64 ol 0.97 mt 0.93 il 1.06	Silver Bar Mine, Cobalt, Ontario.	R. E. Hore.	R. E. Hore, J. G., XVIII, p. 275, 1910.	Quartz diabase.	
4	III.5.4.4.⊙ 1.1.2.3.	or 6.12 di 15.78 ab 17.82 hy 20.35 an 31.97 ol 2.61 mt 2.55 il 1.98	Grassy Portage Bay, Rainy Lake, Ontario.	M. F. Connor.	A. C. Lawson, Can. G. S. Mem. 40, p. 50, 1913.	Hornblende gabbro.	
5	III.5.(3)4.4. 1.2.2.2.	or 5.56 di 28.76 ab 18.34 hy 4.49 an 20.85 ol 15.86 mt 2.78 il 1.67 ap 0.34	Rocky Islet Bay, Rainy Lake, Ontario.	M. F. Connor.	A. C. Lawson, Can. G. S. Mem. 40, p. 91, 1913.	Basic facies of syenite.	
6	III.5.4.4.⊙ 2.1.2.3.	Q 0.96 di 15.28 or 5.00 hy 24.83 ab 8.38 mt 7.66 an 32.80 il 3.50	Lutterworth, Victoria County, Ontario.	F. J. Pope,	F. J. Pope, Tr. Am. Inst. M. E., XXIX, p. 401, 1899.	Diabase.	Not in W. T.
7	''III.''5.4.4''. 2.1.2.2.	Q 4.08 di 18.47 or 3.89 hy 17.32 ab 20.44 mt 2.78 an 29.47 il 3.19	Limekiln Bay, Boothbay quad- rangle, Maine.	M. W. Adams.	I. H. Ogilvie, An. N. Y. Ac. Sc., XVII, p. 550, 1907.	Diabase.	
8	(II)III.5.4.5. 1.3.2.2.	or 1.67 di 16.35 ab 20.96 ol 15.94 an 36.70 mt 3.02 ne 1.99 il 1.67	Green Point, Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, Am. G., XXVI, p. 340, 1900.	Gabbro- diorite.	6 specimens. In W. T., p. 329.
9	III.5.4.5.⊙ 2.3.2.3.	or 1.11 di 19.10 ab 18.34 hy 2.36 an 36.42 ol 16.10 mt 3.71 il 2.16	Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, Am. G., XXVI, p. 346, 1900.	Beerbachite.	6 specimens. In W. T., p. 329.
10	III.4.4(5).(4)5. 2.2.2.2.	or 1.67 di 18.78 ab 11.53 ol 11.37 an 37.53 mt 4.41 il 2.74	Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, Am. G., XXVI, p. 346, 1900.	Malchite.	5 specimens. In W. T., p. 329.

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
11	44.79	15.18	4.13	8.21	7.93	14.10	2.18	0.30	1.33		1.84				99.99	3.04
A3. III	.747	.148	.025	.114	.198	.251	.035	.003			.022					
12	46.59	17.55	1.68	10.46	7.76	10.64	3.31	0.72	0.07	0.10	1.41				100.29	3.047
A3. III	.777	.172	.011	.145	.194	.190	.053	.008			.018					
13	51.78	12.79	3.59	8.25	7.63	10.70	2.14	0.39	0.63		1.41	0.14	0.44		99.89	3.03
A2. II	.863	.125	.023	.115	.191	.191	.034	.004			.018	.001	.006			
14	48.61	17.81	0.25	8.46	7.76	11.16	2.77	0.47	1.63		1.35		0.20		100.47	3.01
A2. II	.810	.175	.002	.118	.194	.199	.045	.005			.017		.003			
15	49.98	17.65	3.48	4.85	7.78	9.42	2.75	0.17	2.23	1.06	0.87	trace	0.15	BaO none	100.19	
A2. II	.833	.173	.022	.068	.195	.168	.045	.002			.011	—	.002			
16	49.90	14.64	4.65	7.52	6.06	9.14	2.73	0.46	1.98	0.46	1.98	0.38	0.18	S BaO 0.02 0.02	100.12	
A2. II	.832	.144	.029	.104	.152	.163	.044	.005			.025	.003	.003			
17	49.28	15.76	1.86	6.94	8.21	10.51	2.58	0.76	1.10	0.57	0.87	0.11	0.20	CO ₂ 0.36 SO ₂ none FeS ₂ 0.99 CuFeS ₂ 0.13 Cr ₂ O ₃ 0.03 NiO 0.09 BaO trace SrO none Li ₂ O none	100.25	
A1. I	.821	.155	.012	.096	.205	.188	.042	.008			.001	.001	.003			
18	47.63	15.49	2.60	8.70	8.40	10.04	3.09	0.36	1.78	0.35	1.93	0.11	0.22	BaO none	100.70	
A2. II	.794	.151	.016	.121	.210	.179	.050	.004			.024	.001	.003			
19	44.97	15.38	2.29	12.39	10.89	7.50	3.02	0.56	0.65	0.10	1.18	0.14	0.22	CO ₂ 0.23 S 0.06 Cr ₂ O ₃ trace V ₂ O ₅ 0.02 NiO 0.02 BaO trace SrO trace	99.64	
A1. I	.750	.150	.014	.172	.272	.134	.048	.006			.015	.001	.003			
20	52.48	14.98	1.13	9.25	7.75	10.83	1.87	0.43	0.23	0.18	1.30	0.13	0.27		100.83	3.110
A2. II	.875	.147	.007	.129	.194	.193	.031	.005			.016	.001	.004			
21	51.88	14.53	1.35	9.14	7.78	9.98	2.06	0.93	0.97	0.12	1.35	0.14	0.10		100.33	2.98
A2. II	.865	.142	.009	.127	.195	.179	.033	.010			.017	.001	.001			
22	51.84	15.11	1.78	8.31	7.27	10.47	1.87	0.34	1.33	0.56	1.22	0.13	0.09		100.32	2.93
A2. II	.864	.148	.011	.115	.182	.188	.031	.004			.015	.001	.001			
23	51.14	12.99	1.50	9.14	11.58	10.08	1.72	0.52	0.59	0.14	1.13	0.06	0.16		100.75	3.057
A2. II	.852	.127	.009	.127	.290	.180	.028	.005			.003	—	.002			
24	51.03	11.92	1.52	10.85	12.08	9.22	1.50	0.39	0.54	0.17	0.93	0.08	0.15		100.38	3.122
A2. II	.851	.117	.009	.151	.302	.164	.024	.004			.012	—	.002			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
11	III.5''4.''5. 2.2.2.2.	or 1.67 di 31.84 ab 12.58 ol 9.45 an 30.58 mt 5.90 ne 3.12 il 3.39	Seal Ledge, Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, Am. G., XXVI, p. 340, 1900.	Hornblende gabbro.	In W. T., p. 329.
12	''III.5(6).4.4(5). 1.3.1.3.	or 4.45 di 18.02 ab 16.77 ol 18.92 an 30.86 mt 2.55 ne 5.96 il 2.74	Salem Neck, Essex County, Massachusetts.	H. S. Washing- ton.	H. S. Washington, J. G., VII, p. 285, 1899.	Camptonite.	In W. T., p. 329.
13	III.(4)5.4.4(5). 2.1.2.3.	Q 5.34 di 22.78 or 2.22 hy 18.60 ab 17.82 mt 5.34 an 24.19 il 2.78	West Rock, New Haven, Connecticut.	G. W. Hawes.	G. W. Hawes, A. J. S., IX, p. 186, 1875.	Dolerite.	Complete in A. J. S., XXII, p. 231, 1881. Not in W. T.
14	(II)III.5.4.(4)5. 1.3.2.3.	or 2.78 di 16.78 ab 23.58 ol 18.00 an 34.75 mt 0.46 il 2.58	Maltby Park, New Haven, Connecticut.	G. W. Hawes.	G. W. Hawes, A. J. S., XI, p. 124, 1876.	Metadiabase.	Not in W. T.
15	III''5.4.5. 2.1.2.2.	Q 1.50 di 9.29 or 1.11 hy 19.96 ab 23.58 mt 5.10 an 35.03 il 1.67	Bet. Preston and Griswold, Connecticut.	G. Steiger.	G. F. Loughlin, U. S. G. S. B. 492, p. 114, 1912.	Norite.	
16	(II)III.(4)5.''4. (4)5. 2.1.2.3.	Q 5.70 di 10.79 or 2.78 hy 16.98 ab 23.06 mt 6.73 an 26.41 il 3.80 ap 1.01	Near Preston, Connecticut.	G. Steiger..	G. F. Loughlin, U. S. G. S. B. 492, p. 114, 1912.	Quartz diorite.	
17	''III.5.''4.4''. 2.2.2.2.	or 4.45 di 17.95 ab 22.01 hy 11.30 an 29.19 ol 7.35 mt 2.78 il 1.67 ap 0.34	Prospect Hill, Litchfield, Connecticut.	W. F. Hille- brand.	W. H. Hobbs, Ros. Fests., p. 32, 1906.	Hornblende norite.	
18	III.5.(3)4.''5. 2.3.2.2.	or 2.22 di 17.76 ab 26.20 hy 2.27 an 20.97 ol 15.37 mt 3.71 il 3.65 ap 0.34	Prospect Hill, Preston, Connecticut.	G. Steiger.	G. F. Loughlin, U. S. G. S. B. 492, p. 114, 1912.	Amphibolite.	Dike.
19	III.5.(3)4.''5. 2.4.1.3.	or 3.34 di 7.94 ab 20.96 ol 31.20 an 26.69 mt 3.25 ne 1.99 il 2.16 ap 0.34	Elizabethtown, Essex County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. B. 168, p. 37, 1900.	Norite.	In W. T., p. 331.
20	III.5.4.4(5). 1.1.2.3.	Q 3.24 di 17.96 or 2.78 hy 25.12 ab 16.24 mt 1.62 an 30.66 ol 2.43 ap 0.34	Palisades, Weehawken, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 121, 1908.	Diabase.	
21	III.5.4.4.⊙ 1.1.2.3.	Q 2.10 di 17.49 or 5.56 hy 24.40 ab 17.29 mt 2.09 an 27.52 il 2.58 ap 0.34	Weehawken, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 121, 1908.	Basaltic diabase.	
22	III.''5.4.(4)5. 1.1.2.3.	Q 5.04 di 16.32 or 2.22 hy 22.11 ab 16.24 mt 2.55 an 31.41 il 2.28 ap 0.34	Scotch Plains, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 159, 1908.	Diabase.	Upper layer. Cf. No. 13, III.5.3.4.
23	III''5.4.4(5) 1.1.2.2.	or 2.78 di 19.08 ab 14.67 hy 29.92 an 26.13 ol 2.98 mt 2.09 il 1.98	Englewood, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 121, 1908.	Diabase.	
24	III(IV).5.4.4(5). 1.1.2.2.	or 2.22 di 16.16 ab 12.58 hy 39.82 an 24.74 mt 2.09 il 1.82 ap 0.34	Englewood, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 121, 1908.	Diabase.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNESE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
25	51.09	14.23	2.56	7.74	7.56	10.35	1.92	0.42	1.01	1.66	1.30	0.16	0.25		100.25	2.936
A2. II	.852	.139	.016	.107	.189	.185	.031	.004			.016	.001	.003			
26	50.19	14.65	3.41	6.96	7.95	9.33	2.64	0.75	2.38	0.66	1.13	0.18	0.07		100.30	2.92
A2. II	.836	.144	.021	.097	.199	.166	.043	.008			.014	.001	.001			
27	50.40	15.60	3.65	6.30	6.08	10.41	2.57	0.62	1.67	1.02	1.35	0.16	0.06		99.89	2.89
A2. II	.840	.153	.023	.088	.152	.186	.042	.007			.017	.001	.001			
28	49.17	13.80	4.90	10.61	5.04	9.87	2.21	0.54	0.73	1.04	1.50	0.24	0.07	SrO 0.03	99.75	2.997
A2. II	.820	.135	.031	.147	.126	.177	.035	.006			.019	.002	.001			
29	48.68	14.39	4.00	10.09	6.32	9.23	2.31	0.47	2.03	0.46	1.69	0.29	0.22	CO ₂ none S trace Cr ₂ O ₃ none NiO trace BaO trace SrO none	100.18	
A1. I	.811	.141	.025	.140	.158	.164	.037	.005			.021	.002	.003			
30	46.79	14.22	5.10	9.42	5.86	10.14	2.38	0.77	2.98	0.54	1.66	0.35	0.18	CO ₂ none	100.39	
A2. II	.780	.139	.032	.131	.147	.181	.039	.008			.021	.002	.003			
31	51.68	15.87	1.46	8.43	7.84	11.08	1.86	0.34	0.15	0.16	0.72	0.12	0.15		99.86	
A2. II	.861	.155	.009	.117	.196	.198	.030	.003			.009	.001	.002			
32	47.67	15.93	1.96	6.80	8.99	12.32	1.68	0.79	1.80	0.12	0.85	0.13	1.51	S 0.16	100.71	
A2. II	.795	.156	.012	.094	.225	.220	.027	.008			.011	.001	.021			
33	49.62	15.87	1.75	7.90	7.29	12.86	2.17	0.40	1.59	0.27	0.58	0.11	0.20	SO ₂ 0.08	100.69	
A2. II	.827	.156	.011	.110	.182	.230	.035	.004			.007	.001	.003			
34	52.11	13.70	1.22	9.86	8.08	12.16	1.31	0.16	0.53	0.06	0.32	0.05	0.20	ZrO ₂ none S trace NiO 0.03 BaO none SrO none Li ₂ O trace	99.79	
A1. I	.869	.134	.008	.137	.202	.217	.021	.002			.004	—	.003			
35	46.91	15.85	2.86	9.95	7.01	9.62	2.65	0.69	1.62	0.24	0.03	0.26	0.22	ZrO ₂ none S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.03 NiO 0.03 BaO trace SrO trace	99.98	
A1. I	.782	.155	.018	.139	.175	.171	.043	.007			.025	.002	.003			
36	47.90	15.60	3.69	8.41	8.11	9.99	2.05	0.23	2.34	0.15	0.82	0.13	0.17	CO ₂ 0.38 Cr ₂ O ₃ trace NiO 0.10 BaO 0.05	100.12	
A2. II	.798	.153	.023	.117	.203	.178	.033	.002			.010	.001	.002			
37	47.69	16.02	2.41	8.70	8.31	10.54	2.44	none	2.04	0.44	1.38	0.06	0.26	CO ₂ none ZrO ₂ none S none BaO none SrO none	100.29	
A1. I	.795	.157	.015	.121	.208	.188	.039	—			.018	—	.003			
38	49.56	17.81	2.76	9.48	5.93	9.70	2.87	none	0.50		0.48	0.67	0.06		99.82	2.967
A2. II	.826	.175	.017	.133	.148	.173	.047	—			.006	.005	—			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
25	III.(4)5.4.(4)5. 2.1.2.2.	Q 5.34 di 17.59 or 2.22 hy 20.66 ab 16.24 mt 3.71 an 28.91 il 2.43 ap 0.34	Hartshorne's quarry, Springfield, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 159, 1908.	Basalt.	Middle layer.
26	III.5.(3)4.4''. 2.1.2.2.	Q 0.84 di 15.56 or 4.45 hy 20.77 ab 22.53 mt 4.87 an 25.85 il 2.13 ap 0.34	Hartshorne's quarry, Springfield, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 159, 1908.	Basalt.	Lower layer.
27	(II)III.5''4.4(5). 2.1.2.2.	Q 3.72 di 16.78 or 3.89 hy 13.59 ab 22.01 mt 5.34 an 28.91 il 2.58 ap 0.67	Jersey City, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 121, 1908.	Basaltic diabase.	
28	III.(4)5.4.4(5). 2.1.2.3.	Q 5.16 di 17.48 or 3.34 hy 16.88 ab 18.34 mt 7.19 an 26.13 il 2.89 ap 0.67	Millington, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 159, 1908.	Basalt.	
29	III.5.4.(4)5. 2.1.2.3.	Q 2.88 di 13.23 or 2.78 hy 22.10 ab 19.39 mt 5.80 an 27.52 il 3.19 ap 0.67	Roberts road, Bryn Mawr, Pennsylvania.	W. F. Hille- brand.	F. Bascom, B. G. S. A., XVI, p. 319, 1905.	Metagabbro.	
30	III.5''4.4''. 2.1.2.3.	Q 0.24 di 18.64 or 4.45 hy 16.26 ab 20.44 mt 7.42 an 25.58 il 3.56 ap 0.67	Green Ridge quadrangle, South Mountain, Pennsylvania.	G. Steiger.	F. Bascom, U. S. G. S. rec. lab.	Metabasalt.	
31	III.5.4''5. 1.1.2.3.	Q 2.94 di 16.56 or 1.67 hy 24.86 ab 15.72 mt 2.09 an 33.92 il 1.37 ap 0.34	Rocky Ridge, Maryland.	E. A. Schneider.	J. S. Diller, U. S. G. S. B. 148, p. 90, 1897.	Diabase.	In W. T., p. 331.
32	III.5.4.4.⊙ 1.2.2.2.	or 4.45 di 21.57 ab 14.15 hy 9.87 an 33.64 ol 9.42 mt 2.78 il 1.67 ap 0.34	Near James River Gap, Virginia.	W. M. Thorn- ton.	T. L. Walker, pers. com.	Gabbro.	
33	III.5.4.(4)5. 1.1.2.3.	or 2.22 di 24.98 ab 18.34 hy 12.32 an 32.53 ol 4.53 mt 2.55 il 1.06 ap 0.34	Copper Hill, Ducktown, Tennessee.	C. Palmer.	F. B. Laney, U. S. G. S. rec. lab.	Gabbro.	
34	III.''5.4''''5. 1.1.1.3.	Q 4.38 di 24.21 or 1.11 hy 25.18 ab 11.00 mt 1.86 an 30.86 il 0.61	Near Cranberry, North Carolina.	W. F. Hille- brand.	A. Keith, U. S. G. S. B. 168, p. 52, 1900.	Diabase.	In W. T., p. 311.
35	''III.5''4.4(5). 2.2.2.3.	or 3.89 di 13.44 ab 22.53 hy 10.29 an 29.19 ol 10.09 mt 4.13 il 3.90 ap 0.67	Hump Mountain, Mitchell County, North Carolina.	W. F. Hille- brand.	A. Keith, U. S. G. S. B. 168, p. 52, 1900.	Diorite.	In W. T., p. 331.
36	III.5.4.5.⊙ 2.1.2.2.	Q 0.36 di 12.85 or 1.11 hy 25.41 ab 17.29 mt 5.34 an 32.80 il 1.51 ap 0.34	Penokee-Gogebic Region, Michigan.	T. M. Chatard.	C. R. Van Hise, U. S. G. S. Mon. 19, p. 357, 1892.	Diabase.	In W. T., p. 331.
37	III.5.4.5.⊙ 2.2.2.2.	ab 20.44 di 15.82 an 32.80 hy 15.48 ol 6.99 mt 3.48 il 2.74	Greenstone Cliff, Keweenaw Point, Michigan.	G. Steiger.	A. N. Winchell, J. G., XVI, p. 772, 1908.	Olivine diabase.	
38	(II)III.5.4.5. 2.1.2.3.	Q 0.12 di 6.43 ab 24.63 hy 26.14 an 35.58 mt 3.94 il 0.91 ap 1.68	Sec. 26, T. 64 N., R. 8 W., Minnesota.	W. H. Melville.	W. S. Bayley, J. G., III, p. 10, 1895.	Gabbro.	In W. T., p. 333.

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
39	48.88	16.39	5.51	7.21	5.80	9.11	2.08	0.47	2.15	0.19	1.84	0.10	0.15	CO ₂ 0.09 S 0.05 Cr ₂ O ₃ none BaO 0.02 SrO none CuO 0.02	100.06	2.974
A1. I	.815	.161	.034	.100	.145	.163	.034	.005			.019	.001	.002			
40	48.27	16.29	4.55	10.09	4.94	8.42	2.14	0.77	1.67	0.64	2.46	0.14	0.17	CO ₂ 0.05 S 0.04 Cr ₂ O ₃ none BaO 0.04 CuO 0.03	100.71	2.986
A1. I	.805	.160	.029	.140	.124	.150	.034	.008			.031	.001	.002			
41	45.66	16.44	0.66	13.90	11.57	7.23	2.13	0.41	0.83	0.07	0.92	0.05	trace	Cr ₂ O ₃ trace NiO 0.16	100.03	
A2. II	.761	.161	.004	.193	.289	.129	.034	.004			.012	—	—			
42	43.50	18.06	7.52	7.64	3.47	13.39	2.00	1.30	1.22		2.10				100.20	
A3. III	.725	.177	.047	.106	.087	.239	.032	.014			.025					
43	50.36	13.63	2.22	8.38	8.67	11.50	2.54	0.75	0.71	0.05	0.90	0.07	0.20		99.98	
A2. II	.869	.134	.014	.117	.217	.205	.041	.008			.011	—	.003			
44	47.87	16.34	3.59	7.17	7.80	10.33	2.43	0.92	1.25	0.28	1.02	0.41	0.14	CO ₂ 0.44 NiO 0.02 BaO 0.03	100.04	
A2. II	.798	.160	.023	.100	.195	.184	.039	.010			.013	.003	.002			
45	45.71	10.80	4.43	9.35	13.75	10.48	1.58	0.85	0.97		1.83	0.11	0.17	Cr ₂ O ₃ 0.10	100.13	
A2. II	.762	.106	.028	.130	.344	.187	.025	.009			.023	.001	.002			
46	52.00	11.59	2.72	7.18	12.87	10.49	1.06	0.92	0.37	0.18	0.99	trace	trace	CO ₂ none S trace Cr ₂ O ₃ trace NiO 0.04 BaO trace	100.41	
A2. II	.867	.114	.017	.100	.322	.188	.017	.010			.012	—	—			
47	47.54	16.73	6.69	6.67	6.38	8.74	2.81	1.10	0.36		2.76	0.51	0.19	BaO 0.03	100.51	
A2. II	.792	.164	.042	.093	.160	.156	.045	.012			.034	.004	.003			
48	49.00	16.87	2.09	8.50	6.70	10.21	2.57	0.66	1.00	0.72	1.11	0.13	0.10	ZrO ₂ 0.02 Cl 0.05 S none Cr ₂ O ₃ 0.02 V ₂ O ₅ trace BaO trace SrO none	99.75	
A1. I	.817	.165	.013	.118	.168	.182	.042	.007			.014	.001	.001			
49	47.41	16.35	3.37	7.72	8.55	10.45	2.50	0.75	0.11	0.08	1.54	0.49	0.27	CO ₂ none SO ₂ none Cl trace BaO 0.04 SrO trace	99.63	2.95
A1. I	.790	.160	.021	.107	.214	.187	.040	.008			.019	.003	.004			
50	47.76	13.98	1.99	8.72	9.07	12.71	1.65	0.20	2.06	0.22	1.48	0.12	0.14	CO ₂ none ZrO ₂ none SO ₂ none S 0.04 BaO 0.04 SrO none	100.14	
A1. I	.796	.137	.013	.121	.227	.227	.027	.002			.019	.001	.002			
51	50.36	15.83	2.29	8.11	7.90	9.25	3.05	0.86	0.27	0.06	1.33	0.21	0.24	CO ₂ none SO ₂ none S none NiO none BaO trace SrO trace	99.75	
A1. I	.839	.155	.014	.113	.193	.165	.049	.009			.017	.002	.003			
52	50.56	14.49	1.78	10.20	5.90	10.13	2.91	0.38	1.50	0.20	1.67	trace	0.25	ZrO ₂ none Fe ₂ O ₃ 0.28 NiO trace BaO trace SrO none	100.25	
A1. I	.843	.142	.011	.142	.148	.180	.047	.004			.021	—	.004			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
39	(II)III.(4)5.4.4(5). 2.1.2.3.	Q 6.30 di 8.53 or 2.78 hy 16.85 ab 17.82 mt 7.89 an 33.92 il 2.89 ap 0.34	Taylors Falls, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 644, 1910.	Diabase.	
40	(II)III."5.4.4. 2.1.1.3.	Q 4.92 di 6.64 or 4.45 hy 19.94 ab 17.82 mt 6.73 an 32.80 il 4.71 ap 0.34	Pine City, Minnesota.	F. F. Grout.	F. F. Grout, J. G. XVIII, p. 647, 1910.	Diabase.	
41	III.5.4.(4)5. 1.4.1.3.	or 2.22 di 1.36 ab 17.82 hy 9.99 an 34.19 of 31.07 mt 0.93 il 1.69	Birch Lake, Minnesota.	H. N. Stokes.	W. S. Bayley, J. G., I, p. 173, 1893.	Olivine gabbro.	In W. T., p. 333.
42	"III.5.4.4. 2.1.2.3.	or 7.78 di 24.29 ab 12.05 ol 1.04 an 36.42 mt 10.90 ne 2.56 il 3.80	Magnet Cove, Arkansas.	W. A. Noyes.	J. F. Williams, Ign. R. Ark., p. 295, 1891.	Amphibole monchi- quite.	In W. T., p. 333.
43	III.5.(3)4.4". 1.2.2.2.	or 4.45 di 27.10 ab 21.48 hy 8.57 an 23.63 ol 9.07 mt 3.25 il 1.67	Bootleg Basin, St. Mary River, East Kootenay, British Columbia.	M. F. Connor.	S. Schofield, Can. G. S., rec. lab.	Hypersthene gabbro.	
44	"III.5.4.4. 2.2.2.2.	or 5.56 di 14.12 ab 20.44 hy 12.30 an 30.86 ol 6.58 mt 5.34 il 1.98 ap 1.01	Haystack Stock, Park County, Montana.	G. Steiger.	W. H. Emmons, J. G., XVI, p. 218, 1908.	Olivine gabbro.	
45	III(IV).5."4.4. 2.2.2.2.	or 5.00 di 24.86 ab 13.10 hy 7.12 an 20.02 ol 18.72 mt 6.50 il 3.54 ap 0.34	Conical Peak, Crazy Mountains, Montana.	L. G. Eakins.	J. P. Iddings, U. S. G. S. B. 148, p. 146, 1897.	Hornblende picrite.	In W. T., p. 333.
46	"III.5.4.(3)4. 1.1.2.2.	Q 2.22 di 22.40 or 5.56 hy 30.90 ab 8.91 mt 3.94 an 24.19 il 1.82	Cow Creek, n. Bridger Peak, Wyoming.	E. T. Allen.	A. C. Spencer, U. S. G. S. P. P. 25, p. 32, 1904.	Norite.	
47	(II)III.5.(3)4.4. 3.1.2.2.	Q 1.20 di 7.91 or 6.67 hy 14.91 ab 23.58 mt 9.74 an 29.75 il 5.17 ap 1.34	Near Grants, Mount Taylor Region, New Mexico.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 185, 1897.	Basalt.	In W. T., p. 333.
48	"III.5.4.4(5). 2.2.2.3.	or 3.89 di 14.35 ab 22.01 hy 14.80 an 32.25 ol 5.18 mt 3.02 il 2.13 ap 0.34	Near Black Peak, Globe District, Arizona.	W. F. Hille- brand.	F. L. Ransome, U. S. G. S. P. P. 12, p. 84, 1903.	Olivine diabase.	
49	"III.5.4.4".	or 4.45 di 14.55 ab 20.96 hy 8.21 an 31.14 of 11.23 mt 4.87 il 2.89 ap 1.01	Kendrick Peak, San Francisco Mountains, Arizona.	H. H. Robin- son.	H. H. Robinson, U. S. G. S. P. P. 76, p. 152, 1913.	Basalt.	
50	III.5.4."5.	or 1.11 di 26.12 ab 14.15 hy 16.14 an 30.02 ol 4.09 mt 3.02 il 2.89 ap 0.34	Treadwell mine, Douglas Island, Alaska.	G. Steiger.	A. C. Spencer, U. S. G. S. B. 287, p. 63, 1906.	Diorite.	
51	"III.5.(3)4.4". 2.2.2.3.	or 5.00 di 14.19 ab 25.68 hy 13.98 an 26.97 ol 7.02 mt 3.25 il 2.58 ap 0.67	Naches Pass, Snoqualmie quadrangle, Washington.	G. Steiger.	Smith and Calkins, U. S. G. S. Fol. 139, p. 9, 1906.	Basalt.	
52	III.5.(3)4."5. 2.1.2.3.	Q 0.48 di 20.44 or 2.22 hy 19.20 ab 24.63 mt 2.55 an 25.30 il 3.19	Cedar Creek, n. Ophir, Port Orford quad- rangle, Oregon.	W. F. Hille- brand.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Basalt.	

CLASS III. SALT-FEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNAISE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
53	50.14	15.26	1.19	8.75	7.21	9.34	2.76	0.95	2.22	0.23	1.42	0.24	trace	CO ₂ none S 0.04 Cr ₂ O ₃ trace BaO 0.03 SrO none Li ₂ O none	99.78	
A1. I	.836	.150	.008	.122	.180	.167	.045	.010			.018	.002	—			
54	50.01	15.25	2.72	5.35	9.35	10.44	1.50	0.60	1.35	2.61	0.68	0.03	0.12	CO ₂ none ZrO ₂ none S none BaO none SrO none	100.01	
A1. I	.833	.150	.017	.075	.234	.187	.024	.006			.009	—	.002			
55	51.32	15.28	0.47	8.59	7.25	11.58	2.92	0.22	0.95	0.06	1.23	0.25	0.16	BaO none SrO trace Li ₂ O trace	100.28	
A2. II	.855	.150	.003	.120	.181	.207	.047	.002			.015	.002	.002			
56	50.89	16.76	3.86	4.69	8.49	11.72	2.61	0.32	0.41		0.79	0.09	0.13	BaO trace	100.76	
A2. II	.848	.164	.024	.065	.212	.209	.042	.003			.010	—	.002			
57	47.93	18.51	2.07	7.25	9.03	11.14	2.28	0.24	0.76		0.73	0.11	0.20	CO ₂ none	100.25	
A2. II	.799	.181	.013	.101	.226	.199	.037	.003			.009	.001	.003			
58	44.77	17.82	5.05	6.95	8.22	10.36	2.13	0.92	2.64		0.53	0.72	trace		100.11	
A2. II	.746	.175	.032	.097	.206	.185	.034	.010			.006	.005	—			
59	50.10	16.10	4.50	4.77	8.47	11.70	1.16	0.51	1.84		1.89	trace			100.04	
A3. III	.835	.157	.028	.067	.212	.209	.019	.005			.001	—				
60	48.71	18.40	3.70	5.33	10.30	10.11	2.34	0.43	0.25		1.08	0.06			100.71	
A2. II	.812	.180	.023	.074	.258	.180	.038	.004			.014	—				
61	53.16	15.01	1.27	8.29	7.45	10.36	2.22	1.16	0.56		0.16	0.08	0.15	Cl trace S trace NiO 0.01 BaO 0.15 PbO 0.02 CuO 0.01	100.12	
A1. I	.886	.147	.008	.115	.186	.185	.035	.012			.002	—	.002			
62	52.78	13.66	2.40	8.64	7.95	9.52	2.34	0.20	1.89		0.23	none	0.11	CO ₂ none S none	99.72	
A2. II	.880	.134	.015	.120	.199	.169	.037	.002			.003	—	.002			
63	52.00	17.29	2.90	8.26	6.95	8.80	2.81	0.18	0.35		0.53	0.01	0.05	CO ₂ 0.06 FeS ₂ trace CaO none CuO trace PbO none	100.14	3.07
A2. II	.867	.170	.018	.115	.174	.157	.045	.002			.007	—	—			
64	51.74	14.26	3.67	10.08	6.86	8.78	2.65	0.26	0.16		0.78	0.03	0.14	CO ₂ 0.13 S trace PbO trace	99.59	
A2. II	.862	.140	.023	.140	.172	.157	.043	.003			.010	—	.002			
65	51.50	10.89	1.75	6.84	13.91	10.19	1.18	0.24	2.40		0.20	trace	trace	CO ₂ none ZrO ₂ none Cl 0.11 S none CoO none BaO 0.65 Cu, Pb trace	99.86	
A1. I	.858	.107	.011	.095	.348	.182	.019	.002			.003	—	—			
66	51.37	13.90	4.55	9.86	6.64	10.36	2.42	0.06	0.50		0.32	trace	0.12	CO ₂ 0.10 S trace CoO trace CuO trace PbO none	100.20	3.00
A2. II	.856	.136	.029	.137	.166	.185	.039	.001			.004	—	.002			
67	51.19	15.80	3.08	11.20	5.63	9.58	2.09	0.60	0.30		0.40	0.01	trace	CO ₂ none FeS ₂ trace CoO trace CuO trace PbO trace	99.88	
A2. II	.853	.155	.019	.156	.141	.171	.034	.006			.005	—	—			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
53	"III.5.(3)4.4".	or 5.56 di 14.78 ab 23.58 hy 17.86 an 26.41 ol 4.08 mt 1.86 il 2.74 ap 0.67	Bald Mountain, Port Orford quadrangle, Oregon.	H. N. Stokes.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Gabbro.	
54	III.5.4.4.⊙	Q 3.66 di 14.85 or 3.34 hy 23.05 ab 12.58 mt 3.94 an 33.36 il 1.37	Umpqua River, Riddles quad- rangle, Oregon.	G. Steiger.	G. F. Kay, U. S. G. S. B. 419, p. 167, 1910.	Augite andesite.	
55	III.5."4.5. 1.1.2.3.	or 1.11 di 22.53 ab 24.63 hy 15.17 an 28.08 ol 4.11 mt 0.70 il 2.28 ap 0.67	Near Hornitos, Mariposa County, California.	W. F. Hille- brand.	H. W. Turner, J. G., III, p. 403, 1895.	Diabase.	Also in U. S. G. S. A. R. 17 (1), p. 694, 1896. In W. T., p. 333.
56	"II-III.5.4."5. 1.1.2.2.	Q 0.30 di 19.82 or 1.67 hy 16.17 ab 22.01 mt 5.57 an 33.08 il 1.52	Inskip Crater, n. Lassen Peak, California.	Hillebrand and Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 200, 1897.	Basalt.	In W. T., p. 333.
57	"II-III.5.4."5. 1.1.2.2.	or 1.67 di 12.58 ab 19.39 hy 8.47 an 39.20 ol 13.65 mt 3.02 il 1.37 ap 0.34	Paines Creek, n. Lassen Peak, California.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 200, 1897.	Basalt.	In W. T., p. 333.
58	"II-III.5.4.4. 2.3.2.2.	or 5.56 di 8.25 ab 17.82 hy 8.85 an 36.42 ol 12.66 mt 7.42 il 0.91 ap 1.68	Kosk Creek, Shasta County, California.	L. G. Eakins.	J. S. Diller, A. G., XIX, p. 255, 1897.	Hornblende basalt.	In W. T., p. 333.
59	"III(4)5.4."4. 2.1.2.2.	Q 6.54 di 16.71 or 2.78 hy 17.01 ab 9.96 mt 6.50 an 36.97 il 1.67	Gué de L'Alma, Martinique, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 573, 1904.	Inclusion in dacite.	
60	"II-III.5.4."5. 1.1.2.2.	or 2.22 di 9.23 ab 19.91 hy 15.28 an 35.36 ol 7.87 mt 5.34 il 2.13	Chateaubelair, St. Vincent, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 598, 1904.	Basalt.	
61	III.5."4.4. 1.1.2.3.	Q 1.56 di 19.35 or 6.67 hy 23.23 ab 18.34 mt 1.86 an 27.80 il 0.30	Cuyuni River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 95, 1908.	Diabase.	
62	III."5.4.5. 1.1.2.3.	Q 4.74 di 16.78 or 1.11 hy 25.43 ab 19.39 mt 3.48 an 26.41 il 0.46	Urinambo, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, G. N. W. Dist., II, p. 11, 1898.	Epidiorite.	In W. T., p. 333.
63	(II)III.5.4.5. 1.1.2.3.	Q 2.46 di 7.72 or 1.11 hy 25.50 ab 23.58 mt 4.18 an 34.19 il 1.06	Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 95, 1908.	Diabase.	New analysis of hessose, No. 36. W. T., p. 291.
64	III.5."4.5. 2.1.2.3.	Q 3.24 di 14.38 or 1.67 hy 24.52 ab 22.53 mt 5.34 an 26.13 il 1.52	Essequibo District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 49, 1908.	Epidiorite.	
65	III.5.4.(4)5. 1.1.2.2.	Q 2.10 di 21.32 or 1.11 hy 35.32 ab 9.96 mt 2.55 an 23.91 il 0.46	Mazaruni River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 78, 1908.	Diorite.	
66	III."5.4.5. 2.1.2.3.	Q 3.78 di 20.37 or 0.56 hy 20.54 ab 20.44 mt 6.73 an 26.69 il 0.61	Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 95, 1908.	Diabase.	New analysis of hessose, No. 37. W. T., p. 291.
67	"III.5.4.4(5). 1.1.2.3.	Q 3.24 di 12.96 or 2.34 hy 25.06 ab 17.82 mt 4.41 an 31.97 il 0.76	Potaro River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 95, 1908.	Diabase.	New analysis of diabase, No. 34. W. T., p. 439

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNAISE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
68	51.09	15.70	1.68	8.57	7.74	9.11	2.38	1.55	0.35		1.70	trace	0.41		100.28	
A2. II	.852	.154	.011	.119	.144	.183	.039	.017			.026		.006			
69	43.47	17.30	6.87	7.09	8.60	6.09	2.53	0.74	3.46		2.68	0.27	0.07	Cl 0.18 S 0.12	99.60	
A2. II	7.25	.170	.043	.099	.215	.109	.040	.008			.034	.002	.001			
70	52.50	16.02	1.70	6.58	8.70	10.18	2.34	1.08	0.19		0.62	0.11	0.15	Cr ₂ O ₃ 0.05 BaO 0.02	100.24	
A2. II	.875	.157	.011	.092	.218	.182	.038	.012			.008	.001	.002			
71	46.97	13.87	8.27	5.76	4.76	14.46	1.75	0.45	n. d.		1.99		1.20		99.48	
B2. III	.783	.136	.052	.080	.119	.258	.028	.005			.025		.017			
72	48.05	15.35	1.86	7.53	12.53	11.02	1.26	0.19	0.45	0.15	0.49		0.28	CO ₂ 0.44 S 0.20 Cr ₂ O ₃ 0.14 NiO 0.11 CuO 0.05	100.10	
A1. I	.801	.150	.012	.104	.313	.196	.020	.002			.006		.004			
73	46.46	15.48	3.63	10.23	6.80	9.05	3.01	0.68	1.43	0.89	2.07	0.30	0.48	S 0.08 Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.05 NiO 0.02 BaO 0.02	100.70	
A1. I	.774	.152	.023	.142	.170	.162	.048	.007			.025	.002	.007			
74	47.64	14.15	5.18	7.96	7.38	11.71	2.38	0.71	1.44	0.19	1.27	0.09	0.33	S 0.03 Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.06 NiO trace	100.53	3.01
A1. I	.794	.139	.033	.111	.185	.209	.039	.008			.016	—	.005			
75	46.61	15.14	3.49	7.71	8.66	10.08	2.43	0.67	2.07	1.10	1.81	0.10	0.13	CO ₂ trace Cr ₂ O ₃ 0.04 V ₂ O ₅ 0.04 NiO trace	100.08	2.87
A2. II	.777	.148	.022	.107	.217	.180	.039	.007			.023	.001	.002			
76	44.01	12.69	3.62	8.75	12.86	10.57	1.68	0.49	2.73	0.89	1.66	0.17	0.21	CO ₂ trace S 0.11 Cr ₂ O ₃ trace NiO trace	100.44	2.95
A2. II	.733	.125	.023	.122	.322	.189	.027	.005			.021	.001	.003			
77	45.37	15.16	3.38	11.58	6.72	8.11	2.90	0.44	1.96	1.18	2.87	0.29	0.31	S none NiO none BaO none	100.27	
A2. II	.756	.148	.021	.161	.168	.145	.047	.005			.036	.002	.004			
78	43.94	14.03	1.95	11.65	10.46	8.99	2.68	0.33	2.31	0.85	2.45	0.20	0.32	CO ₂ 0.16 FeS ₂ 0.04 Fe ₂ Si 0.06 Cr ₂ O ₃ trace NiO none BaO none SrO none Li ₂ O none	100.4?	
A1. I	.732	.137	.012	.162	.262	.161	.044	.004			.031	.001	.005			
79	42.49	13.85	2.59	9.32	11.21	9.76	2.39	0.87	3.35	0.47	2.51	0.61	0.29	CO ₂ 0.22 S none BaO 0.04	100.06	
A2. II	.708	.136	.016	.129	.280	.174	0.39	.009			.031	.004	.004			
80	49.87	14.61	5.21	7.65	5.90	8.70	2.78	0.66	1.23		2.96	0.36	trace	CO ₂ 0.14 Cl trace S 0.04 Cr ₂ O ₃ 0.03 BaO 0.23 SrO 0.02	100.49	
A1. I	.831	.143	.033	.107	.148	.155	.045	.007			.037	.003	—			
81	46.37	16.87	3.01	7.86	6.66	10.68	2.44	0.74	3.12		1.63	0.27		CO ₂ 0.29 Cl 0.02 S trace Cr ₂ O ₃ 0.01 NiO 0.01 BaO 0.06 SrO 0.03	100.07	
A1. I	.773	.165	.019	.109	.167	.191	.039	.008			.020	.002				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
68	III.5.(3)4.4. (1)2.1.2.3.	Q 1.08 di 14.87 or 9.45 hy 19.34 ab 20.44 mt 2.55 an 27.24 il 3.19	Akyma, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Mag., (V) VIII, p. 121, 1911.	Diabase.	
69	III.5."4."4.	or 4.45 hy 23.50 ab 20.96 ol 0.73 an 28.36 mt 9.98 C 2.04 il 5.17 ap 0.67	Masafuera, Juan Fernandez Islands.	N. Sahlbom.	P. D. Quensel, B. G. Un. Ups., XI, p. 280, 1912.	Basanite.	
70	III.5."4.4. 1.1.2.2.	or 6.67 di 16.16 ab 19.91 hy 23.03 an 29.75 ol 0.62 mt 2.55 il 1.22 ap 0.34	Cerro Payne, Patagonia, Chile.	R. Manzelius.	P. D. Quensel, B. G. Inst. Ups., XI, p. 55, 1911.	Bronzite- orthoclase gabbro.	
71	III.(4)5.4.(4)5. 2.1.2.3.	Q 5.10 di 30.66 or 2.78 wo 1.86 ab 14.67 mt 12.06 an 28.63 il 3.80	Randholar Volcano, Reykjanes Peninsula, Iceland.	Hauser.	M. Komorowicz, Vulk. Stud. Ins. Atl., p. 25, 1912.	Basalt.	MnO high?
72	III.5.4(5)."5. 1.2.2.2.	or 1.11 di 15.17 ab 10.48 hy 23.47 an 35.58 ol 8.95 mt 2.78 il 0.91	Allival, Rum Island, Scotland.	W. Pollard.	A. Harker, G. S. Scot., Mem. Sh. 45, p. 98, 1908.	Eucrite.	
73	III.5.(3)4.4(5). 2.3.2.3.	or 3.89 di 13.20 ab 25.15 hy 6.27 an 26.97 ol 12.78 mt 5.34 il 3.95 ap 0.67	Orval, Rum Island, Scotland.	W. Pollard.	A. Harker, G. S. Scot., Mem. Sh. 45, p. 57, 1908.	Olivine basalt.	
74	III.5.4."4. 2.2.2.3.	or 4.45 di 26.29 ab 20.44 hy 5.75 an 25.58 ol 6.41 mt 7.66 il 2.43	Loch a' Bhasteir, Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, p. 370, 1904.	Dolerite.	
75	III.5."4.4(5). 2.2.2.2.	or 3.89 di 16.74 ab 20.44 hy 9.44 an 28.36 ol 9.12 mt 5.10 il 3.50 ap 0.34	Drynoch, Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, pp. 31, 249, 1904.	Olivine basalt.	
76	II.5.4.(3)4. 2.3.2.2.	or 2.78 di 20.70 ab 14.15 hy 2.99 an 25.85 ol 21.53 mt 5.34 il 3.19 ap 0.34	Ciche na Beinne Dirge, Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, p. 325, 1904.	Olivine dolerite.	
77	III.5.(3)4.(4)5. 2.2.2.3.	or 2.78 di 9.58 ab 24.63 hy 11.48 an 26.69 ol 10.90 mt 4.87 il 5.47 ap 0.67	Pennycross House, Mull, Scotland.	E. G. Radley.	G. S. G. B., Sum. Prog. (1912), p. 70, 1913.	Basalt.	
78	III.5."4."5. 2.3.2.3.	or 2.22 di 15.60 ab 18.86 ol 25.45 an 24.74 mt 2.78 ne 2.27 il 4.71 ap 0.34	Sloc na Sgarth, Inverhodge, Jura Island, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem. sh. 35, p. 46, 1911.	Crinanite (analcite dolerite).	Fresh?
79	III.5"(3)4.4. 2.2.2.2.	or 5.00 di 16.31 ab 14.15 ol 22.72 an 24.46 mt 3.71 ne 3.41 il 4.71 ap 1.34	Hillhouse quarry, Linthgow, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem. sh. 28, p. 118, 1911.	Analcite basalt.	Fresh?
80	(II)III.(4)5.(3)4. (5). 2.1.2.3.	Q 5.88 di 12.01 or 3.89 hy 13.93 ab 23.58 mt 7.66 an 25.30 il 5.62 ap 1.01	North Queensferry, n. Edinburgh, Scotland.	Harrison and Reid.	J. B. Harrison, pers. com.	Dolerite.	
81	(II)III.5.4.4" 2.2.2.3.	or 4.45 di 14.87 ab 20.44 hy 8.20 an 32.80 ol 7.65 mt 4.41 il 3.04 ap 0.67	Corstorphine Hill, n. Edinburgh, Scotland.	Harrison and Reid.	J. B. Harrison, pers. com.	Dolerite.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
82	44.62	10.80	5.00	8.26	15.51	6.29	1.50	0.23	5.50		1.64	0.29	0.20	CO ₂ 0.04 S trace Cr ₂ O ₃ 0.07 V ₂ O ₅ 0.01 NiO 0.01 BaO 0.13 SrO 0.03	100.23	
A1. I	.744	.106	.031	.116	.388	.113	.024	.002			.021	.002	.003			
83	45.41	16.85	4.14	8.86	7.27	9.43	3.38	0.64	2.63		1.41	0.18		CO ₂ 0.09	100.29	
A2. II	.757	.165	.026	.123	.182	.168	.055	.007			.018	.001				
84	42.86	13.81	1.93	11.64	7.33	12.84	2.03	0.13	2.81	0.13	3.30	0.30	0.44	CO ₂ 0.22 FeS ₂ 0.80 BaO none	100.66	3.17
A2. II	.714	.135	.012	.162	.183	.229	.032	.001			.041	.002	.006			
85	51.30	18.20	1.28	5.10	9.35	12.79	1.80	0.25	0.31		0.32				100.70	
A3. III	.855	.178	.008	.071	.234	.229	.029	.003			.004					
86	48.70	17.95	0.76	6.48	8.20	13.36	1.90	0.47	0.70		1.18				99.70	
A3. III	.812	.176	.005	.090	.205	.239	.031	.005			.015					
87	45.55	14.86	3.20	8.55	11.70	9.38	2.16	1.47	1.88		1.75	0.24			100.74	
A2. II	.759	.146	.020	.119	.263	.168	.035	.016			.022	.002				
88	44.50	13.10	0.45	9.47	14.60	10.11	1.83	0.86	3.25		2.09	trace			100.26	
A3. III	.742	.128	.003	.132	.365	.180	.029	.009			.026	—				
89	47.28	13.24	4.44	10.50	5.94	11.04	2.62	0.31	2.00		1.48		0.40		99.25	
B2. III	.788	.130	.027	.146	.149	.197	.042	.003			.018		.006			
90	47.00	15.20	5.69	6.59	8.76	12.60	1.45	0.66	0.30		2.30	trace	0.26		100.81	
B2. III	.783	.149	.035	.092	.219	.225	.024	.007			.029	—	.004			
91	47.89	15.34	6.29	6.01	7.53	10.18	2.66	0.44	2.92		0.62		0.34		100.22	
A2. II	.798	.150	.039	.083	.188	.182	.043	.005			.008		.005			
92	45.85	16.86	2.70	11.00	7.92	7.37	2.44	0.89	2.00	0.50	1.37	0.29	0.18	CO ₂ 0.05 BaO trace	99.51	
A2. II	.764	.165	.017	.153	.198	.132	.039	.010			.017	.002	.003			
93	45.64	15.61	2.17	14.97	7.60	7.04	1.68	1.29	0.58	0.14	1.84	0.42	0.28	ZrO ₂ none Cl 0.06 F 0.19 S 0.19 Cr ₂ O ₃ none NiO none BaO 0.02 SrO none	99.72	
A1. I	.761	.153	.014	.208	.190	.126	.027	.014			.023	.003	.004			
94	52.03	15.28	3.59	8.73	5.37	7.59	2.46	1.12	1.34		1.59	0.19	0.30	FeS ₂ 0.14 BaO 0.05	99.79	
A2. II	.867	.150	.023	.121	.134	.136	.040	.012			.020	.001	.004			
95	51.00	16.87	2.16	5.93	8.75	11.37	2.13	0.48	0.43		0.60	trace	0.65		100.37	
A2. II	.850	.166	.014	.082	.219	.204	.034	.005			.008	—	.009			
96	48.55	14.69	2.92	9.60	5.88	10.68	2.40	0.56	2.41		1.40	0.11	0.47		99.67	
A2. II	.809	.144	.018	.133	.160	.191	.039	.006			.018	.001	.007			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
82	III(IV).5.4.'5. 2.2.1.2.	or 1.11 di 5.53 ab 12.58 hy 34.14 an 22.24 ol 7.76 mt 7.19 il 3.19 ap 0.67	Burntisland, n. Edinburgh, Scotland.	Harrison and Reid.	J. B. Harrison, pers. com.	Picrite.	Fresh?
83	(II)III.5.(3)4. (4)5. 2.3.2.2.	or 3.89 di 14.00 ab 23.06 ol 15.85 an 28.63 mt 6.03 ne 3.12 il 2.74 ap 0.34	Nant Llwyngwern, Berwyn Hills, Wales.	M. Dittrich.	Jensen and Jevons, Pr. R. Soc. N. S. W., XLV, p. 523, 1912.	Dolerite.	
84	III.5.4.5.⊙ 2.2.2.3.	or 0.56 di 27.39 ab 14.67 ol 14.67 an 28.36 mt 2.78 ne 1.14 il 4.23 ap 0.67	Tregaddeck, St. Malyn, Cornwall.	E. G. Radley.	C. Reid, G. S. Eng. Mem., Sh. 335, p. 46, 1910.	Proterobase.	
85	'''III.5.4''.'5. 1.1.2.2.	Q 0.30 di 18.41 or 1.67 hy 21.09 ab 15.20 mt 1.86 an 40.59 il 0.61	Les Rondellieres, Brittany, France.	Pisani.	L. Vandernotte, C. R., CXLVIII, p. 1204, 1909.	Gabbro.	Also in Mass. Armor., p. 85, 1913.
86	'''III.5.4.4(5). 1.2.2.2.	or 2.78 di 22.18 ab 16.24 hy 6.48 an 38.92 ol 9.08 mt 1.16 il 2.28	Ernée, Brittany, France.	Pisani.	L. Vandernotte, C. R., CXLVIII, p. 1204, 1909.	Olivine gabbro.	Also in Mass. Armor., p. 97, 1913.
87	III.5.(3)4.'4. 1.3.2.2.	or 8.90 di 14.74 ab 17.55 ol 21.16 an 26.41 mt 4.64 ne 0.43 il 3.34 ap 0.67	Eglazines Volcano, n. Rozier, Aveyron, France.	Pisani.	A. Michel Levy, C. R., CXLVIII, p. 1530, 1909.	Basalt.	Al ₂ O ₃ corrected for P ₂ O ₅ .
88	III.5.4.4.⊙ 1.3.2.2.	or 5.00 di 20.08 ab 10.48 ol 29.12 an 25.02 mt 0.70 ne 2.56 il 3.95	Marcigny, Loire, France.	Pisani.	A. Michel Levy, C. R., CXLVIII, p. 1530, 1909.	Basalt.	
89	III.5.(3)4.'5. 2.1.2.3.	or 1.67 di 25.66 ab 22.01 hy 12.47 an 23.63 ol 2.86 mt 6.26 il 2.77	Cape Flora, Franz Josef Land, Arctic.	J. J. H. Teall.	J. J. H. Teall, Q. J. G. S., LIV, p. 647, 1898.	Basalt.	In W. T., p. 335.
90	III.5.4.4.⊙ 2.1.2.2.	Q 0.18 di 23.53 or 3.89 hy 15.01 ab 12.58 mt 8.12 an 32.80 il 4.41	Sölvsberget, Gran, Norway.	G. Särnström.	W. E. Brögger, Q. J. G. S., L, p. 19, 1894.	Essexite.	In W. T., p. 335.
91	III.5.'4.(4)5. 2.1.2.2.	or 2.78 di 17.73 ab 22.53 hy 15.13 an 28.36 ol 0.45 mt 9.05 il 1.22	Stadsberg, Ragunda Massif, Jemtland, Sweden.	H. Santesson.	A. G. Högbom, Af. Sv. G. Und., No. 182, p. 45, 1899.	Olivine melaphyre.	Not in W. T.
92	(II)III.5.4.4. 2.3.1.3.	or 5.56 di 2.04 ab 20.44 hy 14.47 an 32.25 ol 14.98 mt 3.94 il 2.58 ap 0.67	Norrstrand, N. Ulfön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 137, 1913.	Basalt.	
93	III.5.4.'4. 2.2.1.3.	or 7.78 di 0.92 ab 14.15 hy 23.64 an 31.14 ol 13.32 mt 3.25 il 3.50 ap 1.01	Hamnberget, N. Ulfön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 95, 1913.	Olivine diabase.	
94	(II)III.(4)5.(3)4.4. 2.1.2.3.	Q 6.30 di 8.66 or 6.67 hy 1.98 ab 20.96 mt 5.34 an 27.24 il 3.04	Källsholm, Föglö, Ålands Islands, Finland.	W. Wahl.	W. Wahl, Rosenb. Fests., p. 409, 1906.	Diabase.	Also in T. M. P. M., XXVI, p. 124, 1907.
95	III.5.4.4(5). 1.1.2.2.	or 2.78 di 17.24 ab 17.82 hy 22.07 an 35.31 ol 0.45 mt 3.25 il 1.22	Arvolas quarry, Hyvinge, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., No. 15, p. 62, 1905.	Gabbro.	
96	III.5.4.4(5). '''2.1.2.3.	or 3.34 di 20.37 ab 20.44 hy 18.21 an 27.52 ol 0.34 mt 4.18 il 2.74 ap 0.34	Kanin Peninsula, Russia.	F. Tegenren.	W. Ramsay, Fennia, XXXI, No. 4, p. 24, 1911.	Diabase.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
97	46.55	13.71	4.44	11.80	7.09	10.16	2.04	0.37	0.17		2.22	1.52	0.29		100.36	
A2. II	.776	.134	.028	.164	.177	.182	.032	.004			.028	.011	.004			
98	50.76	16.17	3.32	5.09	9.98	9.55	2.15	0.27	1.75	0.02	0.55	0.28		CO ₂ 0.05 SO ₂ 0.11	100.05	
A2. II	.846	.158	.021	.071	.250	.171	.035	.003			.007	.002				
99	49.39	17.15	3.10	6.22	9.86	8.84	1.80	0.29	2.09	0.21	0.75	0.75		CO ₂ none SO ₂ 0.11	100.56	
A2. II	.823	.168	.019	.086	.247	.158	.029	.003			.010	.005			(100.05)	
100	48.60	16.38	3.01	9.65	6.04	10.18	2.71	0.53	0.59	0.11	1.43	0.12		CO ₂ 0.12 FeS ₂ 0.21	99.68	
A2. II	.810	.161	.019	.134	.151	.182	.044	.006			.018	.001				
101	41.03	11.07	4.65	7.05	15.75	10.59	1.71	0.94	2.85	1.36	2.43	0.41	trace		99.84	
A2. II	.684	.109	.029	.098	.394	.189	.027	.010			.030	.003	—			
102	49.97	16.55	1.82	8.75	5.58	12.59	2.09	0.27	0.63	0.17	0.76			CO ₂ 0.31 FeS ₂ 0.12	99.61	
A3. III	.833	.162	.011	.122	.140	.225	.034	.003			.010					
103	47.45	14.99	2.93	9.75	7.61	10.23	2.06	1.55	1.19	0.34	1.29	0.54		SO ₂ 0.52	100.50	
A2. II	.791	.147	.018	.136	.190	.182	.033	.017			.016	.004				
104	44.39	18.08	6.67	6.90	6.33	10.43	1.70	0.32	0.83		1.36	1.41		CO ₂ 0.28 SO ₂ 1.00	99.70	
A2. II	.740	.177	.042	.096	.158	.186	.027	.003			.017	.010				
105	44.77	13.13	3.83	6.34	12.66	9.98	1.87	1.68	1.19	1.05	2.54	0.66		CO ₂ 0.08 SO ₂ none	99.78	
A2. II	.746	.129	.024	.088	.317	.179	.030	.018			.032	.005				
106	47.72	18.49	0.68	4.54	12.88	11.59	2.81	0.41	1.30		0.24	0.04	trace	CO ₂ none Cl trace SrO trace Li ₂ O trace	100.76	2.916
A2. II	.795	.181	.004	.063	.322	.207	.045	.004			.003	—	—			
107	50.64	14.92	4.99	9.21	6.64	8.53	2.23	0.55	1.06		1.43	0.42		SO ₂ 0.19	100.81	3.043
A2. II	.844	.146	.031	.128	.166	.152	.035	.006			.018	.003				
108	50.62	16.09	0.85	7.21	13.11	8.50	1.52	0.64	1.33		0.43	trace		SO ₂ 0.15	100.45	2.993
A3. III	.844	.158	.005	.100	.328	.152	.024	.007			.005	—				
109	48.68	18.46	1.23	2.83	11.24	14.01	1.09	0.75	1.37		trace	0.08		SO ₂ 0.35	100.09	2.932
A3. III	.811	.181	.008	.039	.281	.250	.013	.008			—	—				
110	49.32	18.50	0.89	5.57	7.94	12.30	2.02	0.94	1.96		0.38	trace		SO ₂ 0.20	100.02	2.928
A2. II	.822	.181	.006	.078	.199	.220	.032	.010			.005	—				
111	46.43	13.62	1.16	9.08	15.15	8.60	1.88	0.84	2.36		1.04	0.22		SO ₂ 0.17	100.55	3.041
A2. II	.774	.134	.007	.126	.379	.154	.031	.009			.013	.002				
112	45.82	17.63	2.01	6.20	13.53	10.94	1.34	0.72	1.41		0.38	0.08		SO ₂ 0.13	100.11	2.994
A2. II	.764	.173	.013	.086	.338	.195	.022	.008			.005	—			(100.19)	

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
97	III.5.4.(4)5. 2.1.2.3.	Q 1.68 di 10.73 or 2.22 hy 27.21 ab 16.77 mt 6.50 an 27.24 il 4.26 ap 3.70	Near Laanila, Enare, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., No. 15, p. 69, 1905.	Trapp. (diabase).	
98	"III.5.4."5. 2.1.2.2.	Q 2.40 di 9.91 or 1.67 hy 25.98 ab 18.34 mt 4.87 an 33.36 il 1.06 ap 0.67	Burg Frankenstein, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 25, 1906.	Odinite.	
99	"III.5.4."5. 2.1.1.2.	Q 3.00 di 1.11 or 1.67 hy 31.69 ab 15.20 mt 4.41 an 37.81 il 1.52 ap 1.68	Frankenstein, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 25, 1906.	Odinite.	
100	"III.5."4.(4)5. 2.1.2.3.	or 3.34 di 15.55 ab 23.06 hy 17.54 an 30.86 mt 4.41 il 2.74 ap 0.34	Near Ober Ram- stadt, Odenwald.	K. M. Jene.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 25, 1906.	Diorite.	
101	III(IV).5(6)."4.4. 2.3.2.2.⊙	or 5.56 di 22.54 ab 6.29 ol 24.06 an 21.13 mt 6.73 ne 4.26 il 4.56 ap 1.01	Platzerkuppe, Rhöngebirge.	M. Dittrich.	J. Soellner, N. J. B. B., XXIV, p. 515, 1907.	Hornblende basalt.	
102	III.5.4."5. 1.1.2.3.	Q 0.60 di 23.01 or 1.67 hy 17.24 ab 17.82 mt 2.55 an 34.75 il 1.82	Klein-Zimmer, Hesse.	K. M. Jene.	G. Klemm, Erl. G. Kt. Hes., Bl. Messel, p. 8, 1910.	Diorite.	
103	III.5.4."4. 2.2.2.3.	or 9.45 di 16.35 ab 17.29 hy 9.56 an 26.97 ol 10.85 mt 4.18 il 2.43 ap 1.34	Ober-Absteinach, Hesse.	Surv. lab.	G. Klemm, Erl. G. Kt. Hes., Bl. Birkenau, p. 26, 1905.	Diorite.	
104	(II)III."5.4."5. 3.1.2.3.	Q 4.14 di 1.33 or 1.67 hy 20.05 ab 14.15 mt 9.74 an 40.87 il 2.58 ap 3.36	Waschenbach, Bl. Rossdorf, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 29, 1912.	Gabbro.	
105	III.5.(3)4.(3)4. 2.3.2.2.	or 10.01 di 17.72 ab 15.72 ol 19.56 an 22.52 mt 5.57 il 4.86 ap 1.68	Londorf, Giessen, Hesse.	K. M. Jene.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 460, 1908.	Basalt.	
106	"III.5"4."5. 1.3.2.2.	or 2.22 di 16.55 ab 15.20 ol 22.65 an 36.70 mt 0.93 ne 4.54 il 0.46	Hohenberg, n. Bühne, Westphalia.	P. Jannasch.	F. Rinne, Sb. Pr. Ak. W., 1891, p. 980.	Olivine gabbro.	Inclusion in basalt. In W. T., p. 335.
107	"III.(4)5.4.4(5). 2.1.2.3.	Q 6.36 di 8.37 or 3.34 hy 22.94 ab 18.34 mt 7.19 an 29.19 il 2.74 ap 1.01	Klein Rabental, Brocken, Harz.	Fischer.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 365, 1906.	Gabbro.	Inclusion in granite.
108	III.5.4.4.⊙. 1.2.1.2.	or 3.89 di 5.56 ab 12.58 hy 33.64 an 35.31 ol 6.04 mt 1.16 il 0.76	Molkenhaus, Brocken, Harz.	Klüss.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 366, 1906.	Mica norite.	
109	"III.5.4(5).4. 1.2.2.1.	or 4.45 di 20.81 ab 9.43 hy 9.59 an 43.09 ol 9.10 mt 1.86	Baste, Brocken, Harz.	Eyme.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 367, 1906.	Norite.	
110	(II)III.5.4.4. 1.2.2.2.	or 5.56 di 18.17 ab 16.77 hy 8.11 an 38.64 ol 8.56 mt 1.39 il 0.76	Radautal, Brocken, Harz.	Klüss.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 365, 1906.	Augite norite.	
111	III.5.4.4.⊙ 1."4.1.2.	or 5.00 di 11.83 ab 16.24 hy 5.15 an 26.13 ol 29.54 mt 1.62 il 1.98 ap 0.67	Molkenhaus, Brocken, Harz.	Fischer.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 368, 1906.	Olivine gabbro.	
112	"III.5.4"4. 1.3.1.2.	or 4.45 di 11.52 ab 11.53 hy 3.59 an 39.75 ol 24.10 mt 3.02 il 0.76	Radautal, Brocken, Harz.	Eyme.	O. H. Erdmannsdorfer, Jb. Pr. G. L.-A., XXVII, p. 369, 1906.	Olivine. norite.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
113	44.57	13.06	6.84	17.90	6.53	6.29	1.60	0.45	1.03		1.87	0.65		CO ₂ trace SO ₃ trace	100.79	2.996
A2. II	.743	.128	.043	.249	.163	.113	.026	.005			.023	.005				
114	45.34	19.35	1.35	8.79	10.84	9.45	2.66	0.60	1.15		1.20				100.73	
A3. III	.756	.190	.009	.122	.271	.169	.043	.006			.015					
115	44.16	12.96	8.07	3.10	10.83	12.26	1.92	0.72	2.41	0.46	2.06	1.03			99.98	2.965
A2. II	.736	.127	.050	.043	.271	.219	.031	.008			.026	.007				
116	46.14	14.74	6.45	4.72	8.81	10.57	2.88	0.61	1.84		1.77	0.71			99.23	
A2. III	.769	.145	.040	.065	.220	.189	.047	.007			.022	.005				
117	48.87	16.24	5.30	5.21	7.65	8.92	3.03	0.96	2.20		0.82	0.31			99.51	
A2. II	.815	.159	.033	.072	.191	.159	.048	.010			.010	.002				
118	48.60	16.33	3.08	5.72	7.55	9.07	3.13	0.51	2.67	0.05	2.59	0.34	0.17		99.81	2.99
A2. II	.810	.160	.019	.079	.189	.163	.050	.005			.032	.002	.002			
119	39.84	19.71	7.73	8.89	7.33	13.52	1.59	0.53	0.86		0.08	trace	trace		100.08	3.182
A3. III	.664	.193	.049	.124	.183	.241	.026	.006			.001	—	—			
120	48.84	14.62	2.08	9.00	7.15	9.33	2.86	0.89	0.49	0.07	3.57	0.36	0.04	CO ₂ none ZrO ₂ none SO ₃ 0.05 Cl 0.42 NiO 0.08 BaO none SrO 0.04 CuO none	99.89	
A1. I	.814	.143	.013	.125	.179	.166	.045	.010			.045	.003	—			
121	51.73	17.52	1.11	3.84	10.02	13.36	1.61	0.48	0.34		0.24	trace	trace		100.25	
A3. III	.862	.172	.007	.053	.250	.239	.026	.005			.003	—	—			
122	48.55	14.69	2.92	9.60	5.88	10.68	2.40	0.56	2.41		1.40		0.47		99.67	
A2. II	.809	.144	.018	.133	.147	.191	.039	.006			.018		.007			
123	50.52	14.84	1.02	9.20	7.80	11.92	2.20	0.47	1.60		0.66				100.23	
A3. III	.942	.146	.006	.128	.195	.213	.035	.005			.008					
124	49.76	14.60	1.89	11.44	5.43	11.04	2.38	0.51	1.77		1.70				100.52	
A3. III	.829	.143	.012	.159	.136	.197	.039	.006			.021					
125	49.40	17.00	3.05	9.25	5.04	11.20	2.05	0.51	2.20		1.08				100.78	
A3. III	.823	.167	.019	.129	.126	.200	.033	.006			.014					
126	47.68	11.43	0.16	8.90	14.81	12.48	1.01	0.52	2.22		0.59		0.07		99.87	
A2. II	.795	.112	.001	.124	.370	.223	.016	.006			.007		.001			
127	47.48	12.00	4.86	8.73	9.89	11.02	2.32	0.48	2.16		0.79				99.73	
A3. III	.791	.118	.030	.121	.247	.196	.037	.005			.010					

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
113	III.5.4.4''. 2.1.1.2.	Q 1.04 or 2.78 ab 13.62 an 26.97 hy 40.46 mt 9.98 il 3.50 ap 1.68	Kunstmannstal, n. Harzburg, Brocken, Harz.	Steffen.	O. H. Erdmannsdörfer, Jb. Fr. G. L.-A., XXVII, p. 367, 1906.	Olivine gabbro.	Norm and mode:
114	(II)III.5.4.(4)5. 1.4.1.2.	or 3.34 ab 16.50 an 39.29 ne 3.27 di 6.27 ol 26.78 mt 2.09 il 2.28	Schluckenau, Bohemia.	C. v. John,	C. v. John, Jb. G. R.-A., Wien, LI, p. 150, 1913.	Gabbro.	Inclusion in basalt.
115	III.5.4.4.⊙ 2.2.2.2.	or 4.45 ab 16.24 an 24.46 di 23.33 hy 5.70 ol 7.42 mt 3.94 il 3.95 hm 5.28 ap 2.35	Dobernberg, n. Tetschen, Bohemia.	R. Pfohl.	J. E. Hibschi, T. M. P. M., XV, p. 255, 1896.	Leucite basalt.	Leucite is analcite? In W. T., p. 461.
116	III.5.(3)4.(4)5. 2.2.2.2.	or 3.89 ab 24.63 an 25.30 di 17.53 hy 6.13 ol 5.63 mt 9.28 il 3.34 ap 1.68	Rekettyes, Lake Balaton, Hungary.	K. Emszt.	J. Vitalis, Erf. Bal. Secs., I (1), No. 2, p. 85, 1911.	Limburgite.	
117	(II)III.5.(3)4.4''. 2.1.2.2.	or 5.56 ab 25.15 an 28.08 di 11.24 hy 16.14 ol 1.04 mt 7.66 il 1.52 ap 0.67	Fitz am Berg, Salzkammergut, Tyrol.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLIX, p. 254, 1899.	Diabase.	In W. T., p. 335.
118	III.5.4.4.5. 2.1.2.2.	or 2.78 ab 26.20 an 29.19 di 11.31 hy 16.66 ol 1.53 mt 4.41 il 4.86 ap 0.67	Isla Persa, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Gabbro- diorite.	
119	III.5(6)4.4.4. 2.3.2.3.	or 3.34 ab 0.52 an 44.76 ne 6.82 di 18.11 ol 13.93 mt 11.37 il 0.15	Pavone, n. Ivrea, Piedmont.	M. Dittrich.	F. R. van Horn, T. M. P. M., XVII, p. 414, 1898.	Hornblende gabbro.	TiO ₂ low? In W. T., p. 347.
120	III.5.(3)4.4. 2.1.2.3.	Q 1.44 or 5.56 ab 20.44 an 26.13 di 13.90 hy 20.03 mt 3.02 il 6.84 ap 1.01	Monte Ponente, Linosa Island.	H. S. Washing- ton.	H. S. Washington, J. G., XVI, p. 17, 1908.	Basalt.	
121	III.5.4.4''. 1.1.2.2.	Q 0.30 or 2.78 ab 13.62 an 39.20 di 21.62 hy 20.16 mt 1.62 il 0.46	Kivakka, Oulangansuu, Karelia, Russia.	G. Aminoff.	V. Hackman, B. C. G. Fin., No. 15, p. 58, 1905.	Diabase.	
122	III.5.4.4(5). 2.1.2.3.	or 3.34 ab 20.44 an 27.52 di 21.09 hy 17.55 ol 0.34 mt 4.18 il 2.74	Mount Pae, Kanin Peninsula, Russia.	F. Tegengren.	W. Ramsay, Fennia, XXXI, No. 4, p. 24, 1911.	Diabase.	
123	III.5.4.(4)5. 1.1.2.3.	or 2.78 ab 18.34 an 29.47 di 24.36 hy 16.76 ol 4.28 mt 1.39 il 1.22	Kwarkouche, Wichera, North Ural Mountains.	Not stated.	Duparc, Pearce, and Tikanovitch, Oural Nord, III, p. 66, 1909.	Diabase.	
124	III.5.4.4(5). 2.1.2.3.	Q 0.12 or 3.34 ab 20.44 an 27.24 di 22.82 hy 18.80 mt 2.78 il 3.19	Pelia River, Wichera, North Ural Mountains.	Not stated.	Duparc, Pearce, and Tikanovitch, Oural Nord, III, p. 67, 1909.	Diabase.	
125	III.5.4.4(5). 2.1.2.3.	Q 2.34 or 3.34 ab 17.29 an 35.58 di 16.54 hy 17.08 mt 4.41 il 2.13	Near Kwarkouche, Wichera, North Ural Mountains.	Not stated.	Duparc, Pearce, and Tikanovitch, Oural Nord, III, p. 66, 1909.	Diabase.	
126	III(IV).5.4.4. 1.2.2.2.	or 3.34 ab 8.38 an 25.02 di 29.75 hy 8.61 ol 21.29 mt 0.23 il 1.06	Tagil District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. Min. Fr., XXXIII, p. 358, 1910.	Olivine gabbro.	
127	III.5.4.(4)5. 2.2.2.2.	or 2.78 ab 19.39 an 21.13 di 26.88 hy 9.30 ol 9.47 mt 6.96 il 1.52	Kamenouchki, South Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. Min. Fr., XXXIII, p. 366, 1910.	Issite (feld- spathic hornblend- ite).	Also in C. R., CLI, p. 1137, 1910.

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
128	45.30	13.40	7.25	6.26	11.53	10.34	2.17	0.23	0.18		2.50	0.39	0.34		99.89	
A2. II	.755	.131	.045	.087	.288	.184	.037	.002			.031	.003	.005			
129	44.06	15.10	5.23	7.93	9.84	12.56	2.20	0.93	0.30		1.80	0.53	0.36		100.84	
A2. II	.734	.148	.032	.110	.246	.224	.035	.010			.023	.004	.005			
130	45.04	16.41	6.02	7.30	3.93	11.42	3.09	0.93	1.41		3.67	0.47		CO ₂ 0.36 S 0.13	100.18	3.003
A2. II	.751	.161	.038	.101	.098	.204	.050	.010			.046	.003				
131	44.50	13.23	4.11	7.76	13.19	11.20	1.69	0.74	1.36		1.72	0.22	trace	CO ₂ 0.36 SO ₃ trace S 0.10	100.18	3.072
A2. II	.742	.130	.026	.108	.330	.200	.027	.008			.022	.002	—			
132	43.30	14.07	5.53	7.17	9.62	10.87	2.41	1.12	2.52		2.83	0.65		S 0.10	100.19	2.997
A2. II	.722	.138	.034	.100	.241	.195	.039	.012			.035	.005				
133	42.39	15.77	5.89	8.66	7.44	9.40	2.05	1.24	3.55		2.61	0.78		S trace	99.78	2.967
A2. II	.707	.155	.037	.120	.186	.168	.033	.013			.033	.006				
134	41.96	15.85	7.64	7.24	8.45	9.54	2.05	1.17	3.07		2.16	0.88		S 0.02	100.03	2.902
A2. II	.699	.155	.048	.100	.211	.170	.033	.013			.027	.006				
135	41.43	13.18	6.95	7.31	11.91	10.74	1.60	0.93	2.15		2.67	0.66		S 0.05	99.65	3.043
A2. II	.691	.128	.044	.101	.298	.192	.026	.010			.033	.005				
136	42.08	16.04	5.93	8.75	6.95	12.66	1.88	0.93	2.76		2.26	0.34	0.32		100.90	
A2. III	.701	.157	.037	.122	.174	.223	.030	.010			.028	.002	.005			
137	53.30	15.11	2.40	6.66	6.05	9.55	2.68	0.94	1.61		1.21	0.08	0.07		99.66	
A2. II	.888	.148	.015	.093	.151	.171	.044	.010			.015	.001	.001			
138	52.80	13.40	1.80	7.38	9.30	11.05	2.16	1.01	0.70		1.20	0.10			100.90	
B2. III	.860	.131	.011	.103	.233	.197	.035	.011			.015	.001				
139	51.30	17.80	1.29	3.35	10.10	12.90	1.53	0.27	n. d.		0.27	0.30			99.11	
B?2. III	.855	.174	.008	.047	.253	.230	.024	.003			.003	.002			(100.11)	
140	51.21	12.36	3.29	6.16	13.26	10.66	1.60	0.41	0.36	0.14	0.70	0.11			100.26	
A2. II	.854	.121	.021	.086	.332	.190	.026	.004			.009	.001				
141	50.20	10.71	2.55	6.60	16.20	10.10	1.71	0.71	0.60		0.71	0.09	0.18	Cr ₂ O ₃ 0.09	100.45	
A2. II	.837	.105	.016	.092	.405	.180	.027	.008			.009	.001	.002		(100.46)	

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
128	III.5.4.5.⊙ 2.2.2.2.	or 1.11 di 17.87 ab 19.39 hy 12.56 an 25.58 ol 7.13 mt 10.44 il 4.71 ap 1.01	Punta Delgada, San Miguel, Azores.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 291, 1896.	Basalt.	In W. T., p. 337.
129	III.5''4.4. 2.3.2.2.	or 5.56 di 24.03 ab 11.00 ol 15.08 an 28.63 mt 7.42 ne 3.98 il 5.30 ap 1.34	Punta Delgada, San Miguel, Azores.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 291, 1896.	Basalt.	In W. T., p. 337
130	(II)III.5.(3)4.4'' 3.1.2.3.	or 5.56 di 20.54 ab 25.15 ol 1.64 an 28.08 mt 8.82 ne 0.57 il 6.99 ap 1.01	Ribeiradas Volta, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV., p. 399, 1912.	Essexite.	
131	III.5.4.4.⊙ 2.3.2.2.	or 4.45 di 21.65 ab 14.15 ol 21.68 an 26.41 mt 6.03 il 3.34 ap 0.67	Barranco del Almendero, La Palma Cal- dera, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 399, 1912.	Essexite.	
132	III.5.(3)4.4. 2.3.2.2.	or 6.67 di 19.98 ab 16.24 ol 13.34 an 24.19 mt 7.89 ne 2.27 il 5.32 ap 1.68	Ribeira Frio, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Basalt.	
133	''III.5.4.4. 2.2.2.3.	or 7.23 di 8.68 ab 17.29 hy 7.81 an 30.30 ol 9.51 mt 8.58 il 5.02 ap 2.02	Chapanna, north Funchal, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Trachy- dolerite.	
134	''III.5.4.4. 3.3.2.2.	or 7.23 di 8.99 ab 17.29 hy 5.26 an 30.30 ol 10.59 mt 11.14 il 4.10 ap 2.02	Eira de Serrado, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Trachy- dolerite.	
135	III.5.4.4.⊙ 2.3.2.2.	or 5.56 di 18.12 ab 13.62 hy 1.13 an 25.58 ol 16.50 mt 10.21 il 5.02 ap 1.68	Calheta, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Trachy- dolerite.	
136	III.5.4.4.⊙ 2.2.2.3.	or 5.56 di 22.93 ab 9.96 ol 10.47 an 32.53 mt 8.58 ne 3.12 il 4.26 ap 0.67	Mindello, Sao Vicente, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 285, 1896.	Basalt.	In W. T., p. 337.
137	(II)III.5.(3)4.4. 2.1.2.3.	Q 5.22 di 16.68 or 5.56 hy 15.44 ab 23.06 mt 3.48 an 26.13 il 2.28 ap 0.34	Conakry-Niger Railway, French Guinea.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 114, 1911.	Quartz diabase.	Also in B. Soc. Fr. Min., XXXV, p. 32, 1912.
138	III.5.(3)4.4. 1.1.2.2.	or 6.12 di 24.40 ab 18.34 hy 20.64 an 23.63 ol 0.76 mt 2.55 il 2.28 ap 0.34	Kilometer 177, Conakry-Niger Railway, French Guinea.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 114, 1911.	Hypersthene diabase.	Also in B. Soc. Fr. Min., XXXV, p. 32, 1912.
139	III.5.4''.(4)5. 1.1.2.2.	Q 2.04 di 16.71 or 1.67 hy 22.16 ab 12.58 mt 1.66 il 0.46 an 40.87 ap 0.67	Kakoulima, French Guinea.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 144, 1911.	Gabbro.	Summation? Also in B. Soc. Fr. Min., XXXV, p. 32, 1912.
140	III''5.4.4(5). 1.1.2.2.	Q 0.48 di 21.19 or 2.22 hy 20.54 ab 13.62 mt 4.87 an 25.30 il 1.37 ap 0.34	Mount Bougourou, French Guinea.	Boiteau.	A. Lacroix, pers. com.	Olivine diabase.	
141	III(IV).5''4.4. 1.2.2.2.	or 4.45 di 23.62 ab 14.15 hy 18.73 an 19.46 ol 14.02 mt 3.71 il 1.37 ap 0.34	Kilometer 110.5, Conakry-Niger Railway, French Guinea.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 114, 1911.	Olivine diabase.	Also in B. Soc. Fr. Min., XXXV, p. 32, 1912.

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNAISE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
142	46.75	16.05	1.10	7.53	17.20	9.15	1.54	0.45	0.27		0.20	0.11		Cr ₂ O ₃ 0.05	100.40	
A2. II	.779	.157	.157	.104	.430	.164	.025	.005			.003	.001			(100.49)	
143	47.87	16.60	5.84	4.52	7.85	10.48	2.15	0.37	1.65		2.28	0.08	0.11	CO ₂ 0.20	100.00	
A2. II	.796	.163	.036	.063	.196	.188	.035	.004			.029		.002			
144	49.95	15.52	3.88	9.91	5.42	9.53	2.01	1.22	0.53	0.36	1.53	0.48			100.44	
A2. II	.833	.152	.024	.138	.136	.170	.032	.013			.019	.003				
145	47.06	15.03	2.46	8.65	7.27	9.88	2.38	1.28	2.12	1.07	2.25	0.34			99.79	
A2. II	.784	.147	.015	.120	.182	.177	.039	.014			.028	.002				
146	46.30	18.48	1.66	5.63	10.13	13.51	2.18	0.26	0.99	0.21	0.70	0.09			100.14	
A2. II	.772	.181	.010	.078	.253	.241	.035	.003			.009	—			(100.17)	
147	45.40	18.60	0.77	6.70	7.45	13.20	2.31	1.25	1.00		2.82				99.50	
A3. III	.757	.182	.005	.093	.186	.236	.037	.013			.035					
148	43.39	13.86	2.71	9.54	9.82	11.98	2.23	1.14	1.55	0.20	3.42	0.58			100.16	
A2. II	.723	.136	.017	.132	.246	.214	.035	.012			.043	.004				
149	43.09	16.46	4.59	6.18	8.34	12.87	1.36	0.82	1.47	1.04	3.31	0.39			99.92	
A2. II	.718	.161	.029	.086	.209	.230	.022	.009			.043	.003				
150	42.54	14.37	3.13	9.07	9.12	12.42	2.06	1.06	2.15	0.34	3.31	0.50			100.21	
A2. II	.709	.141	.019	.126	.228	.221	.033	.012			.043	.004			(100.18)	
151	48.68	15.70	1.81	9.75	6.08	11.64	2.32	0.88	0.10		2.68	0.46			100.10	
A2. II	.811	.154	.011	.136	.152	.208	.037	.009			.034	.003				
152	48.64	14.13	3.01	8.92	7.01	12.34	2.25	0.81	0.08		2.61	0.35			100.15	
A2. II	.811	.138	.019	.124	.175	.220	.036	.009			.033	.003				
153	48.52	14.28	2.06	9.60	7.03	12.54	2.40	0.80	n. d.		2.71	0.29			100.23	
A2. II	.809	.140	.013	.133	.176	.224	.039	.009			.034	.002				
154	48.41	14.82	1.72	9.83	7.11	12.02	2.16	0.85	n. d.		2.87	0.39			100.18	
A2. II	.807	.145	.011	.136	.178	.214	.035	.009			.036	.003				
155	48.26	14.74	2.49	8.95	6.76	12.39	2.38	0.90	0.15		2.81	0.44			100.27	
A2. II	.804	.145	.016	.125	.169	.221	.039	.010			.045	.003				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
142	III.5.4.4'' 1.4.1.2.	or 2.78 di 7.53 ab 13.10 hy 6.78 an 35.31 ol 32.25 mt 1.62 il 0.46 ap 0.34	Sokotoro, French Guinea.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 114, 1911.	Olivine gabbro.	Al ₂ O ₃ incorrect in B. Soc. Fr. Min., XXXV, p. 32, 1912.
143	'''III.5.4.(4)5. 2.1.2.2.	Q 3.42 di 13.82 or 2.22 hy 12.93 ab 18.34 mt 8.35 an 34.47 il 4.41	Mount Bubandjida, Adamawa, Kamerun.	M. Dittrich.	W. Edlinger, In. Diss. Erl., p. 79, 1908.	Gabbro.	
144	'''III.5.4.4. 2.1.2.3.	Q 3.90 di 12.15 or 7.23 hy 20.14 ab 16.77 mt 5.57 an 29.75 il 2.89 ap 1.01	Tanilehy, Sakalave Dis- trict, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 20, 1913.	Labradorite (basalt).	
145	III.5.(3)4.4. 2.2.2.3.	or 7.78 di 17.16 ab 20.44 hy 7.54 an 26.13 ol 9.07 mt 3.48 il 4.26 ap 0.67	Bersevo, Sakalave Dis- trict, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 20, 1913.	Basalt.	
146	'''III.5.4.4.5. 1.3.2.2.	or 1.67 di 21.78 ab 12.58 ol 16.26 an 39.75 mt 2.32 ne 3.12 il 1.37	Mount Fonjay, Sakalave Dis- trict, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVII, p. 14, 1913.	Gabbro.	
147	'''III.5(6).4.4. 2.2.2.2.	or 7.23 di 23.20 ab 8.62 ol 10.41 an 36.70 mt 1.16 ne 5.82 il 5.32	Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 13, 1902.	Olivine gabbro.	
148	III.5(6).(3)4.4. 2.3.2.2.	or 6.67 di 25.02 ab 9.96 ol 15.89 an 24.74 mt 3.94 ne 4.54 il 6.54 ap 1.34	Katsaoka, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Basalt.	
149	III.5.4.4.⊙ 2.2.2.2.	or 5.00 di 19.60 ab 11.53 hy 5.20 an 36.14 ol 5.93 mt 6.73 il 5.54 ap 1.01	Tsiafakafo, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Basalt.	
150	III.5(6).4.4. 2.2.2.2.	or 6.67 di 24.99 ab 8.38 ol 14.05 an 26.69 mt 4.41 ne 4.83 il 6.54 ap 1.34	Ambodivahita, Madagascar.	Boiteau.	A. Lacroix, pers. com.	Basalt.	
151	III.5.4.4.⊙ 2.1.2.3.	or 5.00 di 20.56 ab 19.39 hy 13.97 an 30.02 ol 2.28 mt 2.55 il 5.17 ap 1.01	Reunion Island.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Basalt.	Glassy bomb.
152	III.5.4.4. 2.1.2.3.	or 5.00 di 26.36 ab 18.86 hy 12.26 an 25.85 ol 1.42 mt 4.41 il 5.02 ap 1.01	Lava of 1909, Plaine des Osmondes, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Basalt.	
153	III.5.(3)4.4. 2.2.2.3.	or 5.00 di 28.31 ab 20.44 hy 4.08 an 25.58 ol 8.05 mt 3.02 il 5.17 ap 0.67	Enclos Fouqué, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Basalt.	
154	III.5.4.4.⊙ 2.1.2.3.	or 5.00 di 23.34 ab 18.34 hy 11.72 an 28.08 ol 4.70 mt 2.55 il 5.47 ap 1.01	Lava of 1909, Plaine de Osmondes, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Basalt.	
155	III.5.4.4. 2.2.2.3.	or 5.56 di 25.86 ab 20.44 hy 6.31 an 26.97 ol 4.71 mt 3.71 il 6.84 ap 1.01	Lava of 1863, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
156	47.97	14.57	1.90	9.65	7.03	12.23	2.25	0.94	0.09		2.87	0.34			99.84	
A2. II	.800	.143	.012	.134	.176	.218	.036	.010			.036	.002				
157	47.70	14.84	1.77	9.89	8.33	11.88	2.06	0.93	n. d.		2.40	0.37			100.17	
A2. II	.795	.146	.011	.138	.208	.213	.033	.010			.030	.003				
158	47.63	14.83	3.13	8.48	6.77	13.04	2.26	1.04	0.08		2.81	0.28			100.35	
A2. II	.794	.145	.020	.118	.169	.233	.036	.011			.035	.002				
159	46.91	13.30	2.14	9.56	9.19	11.39	1.84	0.92	1.44		2.75	0.36			99.80	
A2. II	.782	.130	.013	.133	.230	.204	.030	.010			.034	.003				
160	46.77	14.55	1.94	6.70	12.74	13.34	1.47	0.54	0.74		1.46	0.18			100.43	
A2. II	.780	.143	.012	.093	.319	.238	.024	.006			.018	.001				
161	45.36	13.56	1.88	7.34	14.58	14.17	1.01	0.20	1.18		0.74	0.04			100.06	
A2. II	.756	.133	.012	.102	.365	.254	.016	.002			.009	—				
162	44.73	13.30	5.42	6.95	9.12	14.16	1.66	0.60	1.71		2.49	0.16			100.30	
A2. II	.746	.130	.034	.097	.228	.253	.027	.006			.031	.001				
163	43.28	13.58	5.43	8.03	7.63	13.19	2.04	0.66	1.82		3.81	0.41			99.88	
A2. II	.721	.133	.034	.111	.191	.236	.033	.007			.048	.003			(99.86)	
164	49.72	16.84	2.77	9.34	6.62	9.88	1.83	0.68	0.62	0.13	1.63	0.07	0.26	NiO 0.09 BaO trace	100.48	
A2. II	.829	.165	.017	.130	.166	.177	.030	.007			.020	—	.004			
165	51.32	16.84	0.65	12.14	4.22	10.85	1.52	0.41	1.00		1.01		0.29	ZrO ₂ trace	100.25	
A2. II	.855	.165	.004	.168	.106	.194	.024	.004			.013		.004			
166	51.13	17.75	0.95	11.58	4.40	10.83	1.30	0.36	0.95		1.01	trace	0.25		100.51	
A2. II	.852	.174	.006	.161	.110	.193	.021	.004			.013	—	.004			
167	49.08	17.83	0.73	5.38	9.05	12.63	2.47	0.51	1.56	0.22	0.65		0.05		100.16	2.81
A2. II	.816	.175	.005	.075	.226	.225	.040	.050			.008		—			
168	50.24	16.59	2.72	8.35	5.14	8.70	3.54	0.40	1.84	1.02	0.72	0.41	0.29		99.96	2.87
A2. II	.837	.163	.017	.116	.129	.155	.057	.004			.009	.003	.004			
169	48.96	16.58	1.95	8.62	7.97	8.75	3.08	0.91	1.18	0.66	0.81	0.34	0.14		99.95	2.87
A2. II	.816	.163	.012	.119	.199	.156	.050	.010			.010	.002	.002			
170	50.09	11.31	1.91	3.09	13.83	15.63	1.92	trace	1.06	0.61	0.95		0.06	CO ₂ 0.16 Cr ₂ O ₃ 0.21	100.83	
A2. II	.835	.111	.012	.043	.346	.279	.031	—			.012		0.01			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
156	III.5.4.4. 2.2.2.3.	or 5.56 di 25.84 ab 18.86 hy 6.18 an 26.97 ol 7.40 mt 2.78 il 5.47 ap 0.67	Enclos Fouqué, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Basalt.	
157	III.5.4.4.⊙ 2.2.2.3.	or 5.56 di 22.62 ab 17.29 hy 6.24 an 28.63 ol 11.90 mt 2.55 il 4.56 ap 1.01	Enclos Fouqué, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Basalt.	
158	III.5.4.4. 2.2.2.3.	or 6.12 di 28.77 ab 18.86 hy 1.76 an 27.24 ol 6.89 mt 4.64 il 5.32 ap 0.67	Lava of 1905, Plaine des Osmondes, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Basalt.	
159	III.5.4.4.⊙ 2.2.2.2.	or 5.56 di 23.36 ab 15.72 hy 10.40 an 25.02 ol 9.17 mt 3.02 il 5.17 ap 1.01	Reunion Island.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Basalt.	Pelé's hair.
160	III.5.4.4.⊙ 1.2.2.2.	or 3.34 di 24.80 ab 12.58 hy 5.26 an 31.41 ol 16.55 mt 2.78 il 2.74 ap 0.34	Riviere du Mat, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 539, 1912.	Olivine gabbro.	
161	III.5.4(5)4. 1.3.2.2.	or 1.11 di 30.82 ab 6.81 ol 23.28 an 31.97 mt 2.73 ne 0.85 il 1.37	Riviere du Mat, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 539, 1912.	Olivine gabbro.	
162	III.5.4.4.⊙ 2.2.2.2.	or 3.34 di 33.66 ab 13.36 ol 7.91 an 26.97 mt 7.89 ne 0.43 il 4.71 ap 0.34	Vallée du Mat, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 540, 1912.	Microgabbro.	
163	III.5.4.4.⊙ 2.2.2.2.	or 3.89 di 29.27 ab 15.20 ol 6.47 an 25.85 mt 7.89 ne 1.14 il 7.30 ap 1.01	Vallée du Mat, Reunion Island.	Boiteau.	A. Lacroix, C. R., CLV, p. 540, 1912.	Microgabbro.	
164	III.5.4.4. 2.1.2.3.	Q 2.58 di 10.69 or 3.89 hy 24.16 ab 15.72 mt 3.94 an 35.58 il 3.04	Kusjkin Island, Siberia.	H. Backlund.	H. Backlund, Mem. Ac. Sc. St. P., XXI, No. 6, p. 22, 1910.	Diabase.	
165	III.5.4.4(5). 1.1.2.3.	Q 5.70 di 13.40 or 2.22 hy 24.27 ab 12.58 mt 0.93 an 38.09 il 1.98	Mihara Volcano, Oshima, Seven Izu Islands, Japan.	Tokayanagi.	S. Kozi, pers. com.	Andesitic basalt.	Eruption of 1912.
166	(II)III.4(5)4(5). 4'' 1.1.2.3.	Q 6.24 di 10.30 or 2.22 hy 25.07 ab 11.00 mt 1.39 an 41.42 il 1.98	Mihara Volcano, Oshima, Seven Izu Islands, Japan.	Tokayanagi.	S. Kozi, pers. com.	Andesitic basalt.	
167	(II)III.5.4(4)5. 1.3.2.2.	or 2.78 di 20.38 ab 20.44 ol 15.31 an 37.53 mt 1.16 ne 0.28 il 1.22	Watoe Belah, Loh-oelo, Java.	N. Sahlbom.	G. Niethammer, T. M. P. M., XXVIII, p. 246, 1909.	Gabbro- norite.	
168	(II)III.5(3)4.4'' 2.1.2.3.	Q 0.06 di 9.87 or 2.22 hy 20.43 ab 29.87 mt 3.94 an 28.36 il 1.37 ap 1.01	Coopers Plains, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1912.	Basalt.	H. C. Richards, pers. com.
169	(II)III.5(3)4.4'' 1.3.2.3.	or 5.56 di 10.42 ab 26.20 hy 7.07 an 28.63 ol 15.18 mt 2.78 il 1.52 ap 0.67	Chinghee Creek, Queensland.	A. T. Jefferis.	A. R. Agric. Chem. Qld., 1913.	Basalt.	H. C. Richards, pers. com.
170	III(IV).5.4.5. 1.2.2.1.	ab 16.24 di 43.33 an 22.24 hy 1.53 ol 10.90 mt 2.78 il 1.82	Dundas, n. Sydney, New South Wales.	W. N. Benson.	W. N. Benson, Pr. R. Soc. N. S. W., XLIV, p. 530, 1910.	Pyroxenite.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
171	47.88	16.65	2.45	7.08	7.91	9.25	2.64	1.17	1.38	1.02	1.74	0.36	0.22	CO ₂ 0.04 ZrO ₂ trace SO ₃ 0.03 Cl 0.05 S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.01 NiO 0.05 BaO 0.10 SrO trace Li ₂ O none CuO trace	100.04	2.858
A1. I	.798	.163	.015	.099	.198	.165	.043	.013			.022	.003	.003			
172	44.38	16.18	1.94	8.54	10.30	9.20	2.55	1.50	1.99	0.74	1.94	0.31	0.26	CO ₂ 0.04 ZrO ₂ none SO ₃ 0.05 Cl 0.01 F none S none Cr ₂ O ₃ 0.01 V ₂ O ₅ trace NiO 0.04 BaO 0.07 SrO trace Li ₂ O none CuO trace	100.05	2.927
A1. I	.740	.159	.012	.118	.258	.164	.041	.016			.024	.002	.004			
173	45.15	13.40	2.97	13.19	4.23	9.79	2.47	0.49	2.41	0.39	5.04	0.12	0.19		99.84	
A2. II	.753	.131	.019	.183	.106	.175	.040	.005			.063	.001	.003			
174	44.57	15.30	3.20	7.83	10.04	10.00	1.94	1.39	3.21	1.09	1.01	0.41	0.29	CO ₂ 0.01 ZrO ₂ none SO ₃ none Cl 0.01 S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.02 NiO 0.05 BaO 0.05 SrO trace Li ₂ O trace CuO trace	100.43	2.907
A1. I	.743	.150	.020	.108	.251	.179	.032	.015			.013	.003	.004			
175	43.31	16.68	2.31	9.00	10.56	7.95	2.94	0.97	1.72	0.88	2.20	0.65	0.43	CO ₂ 0.03 ZrO ₂ none SO ₃ 0.05 Cl 0.02 S trace Cr ₂ O ₃ 0.11 V ₂ O ₅ trace NiO trace BaO trace SrO none Li ₂ O none	99.81	2.995
A1. I	.722	.163	.014	.125	.264	.142	.047	.010			.028	.005	.006			
176	54.92	14.27	1.28	5.25	10.32	6.42	2.50	0.64	2.96	0.12	0.90		trace	CO ₂ 0.38 FeS ₂ 0.22	100.18	
A2. II	.915	.140	.008	.073	.258	.114	.040	.007			.011		—			
177	52.72	17.37	1.73	5.53	7.42	10.94	2.93	0.65	0.22	0.09	0.61		0.30	CO ₂ 0.04	100.55	2.96
A2. II	.879	.170	.011	.076	.186	.195	.047	.007			.008		.004			
178	50.55	17.16	1.04	3.40	9.97	14.77	1.62	0.11	0.36	0.12	0.05		0.19	FeS ₂ 0.17	99.51	2.95
A2. II	.843	.168	.006	.047	.249	.264	.026	.001			—		.003			
179	47.80	14.30	1.25	12.09	7.40	10.17	2.54	0.60	1.87	0.44	1.23		0.40	CO ₂ 0.24 S trace	100.38	3.02
A2. II	.797	.140	.008	.168	.185	.182	.041	.007			.015		.006			
180	50.72	13.93	1.93	6.27	10.16	13.18	1.04	0.18	1.55	0.16	0.39	0.18	0.41	CO ₂ 0.18 ZrO ₂ none FeS ₂ 0.15 Cr ₂ O ₃ 0.04 V ₂ O ₅ 0.11 BaO none	100.58	3.07
A1. I	.845	.137	.012	.088	.234	.236	.017	.002			.005	.001	.006			
181	50.12	14.90	1.66	7.01	10.00	13.04	1.95	0.08	0.03	0.13	0.26		0.29	CO ₂ 0.03	99.63	3.02
A2. II	.835	.146	.010	.097	.250	.233	.032	.001			.003		.004			
182	49.42	14.95	1.38	10.76	6.16	9.85	2.70	0.72	0.77	0.09	1.95	0.55	0.47	CO ₂ none FeS ₂ 0.26	100.03	3.01
A2. II	.824	.147	.009	.150	.154	.176	.044	.008			.024	.004	.007			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
171	(II)III.5.(3)4.4. 2.2.2.2.	or 7.23 di 12.98 ab 22.53 hy 6.65 an 29.75 ol 10.89 mt 3.48 il 3.34 ap 1.01	Gulgong, New South Wales.	H. P. White.	Mingaye and White. Rec. G. S. N. S. W., VII (4), p. 304, 1904.	Olivine basalt.	
172	(II)III.5.(3)4.4. 2.4.2.2.	or 8.90 di 10.75 ab 21.48 hy 0.43 an 28.36 ol 19.84 mt 2.78 il 3.65 ap 0.67	Mount Apsley, n. Bathurst, New South Wales.	H. P. White.	Mingaye and White, Rec. G. S. N. S. W., VII (4), p. 304, 1904.	Olivine basalt.	
173	III.5.(3)4.4(5). 2.1.2.(3)4.	Q 0.90 di 19.76 or 2.78 hy 14.35 ab 20.96 mt 4.41 an 23.91 il 0.58 ap 0.34	Brogo, New South Wales.	A. Pain.	W. N. Benson, pers. com.	Quartz gabbro.	
174	III.5.''4.''4. 2.3.2.2.	or 8.34 di 14.77 ab 15.72 ol 20.09 an 28.63 mt 4.64 ne 0.57 il 1.98 ap 1.01	Robertson Flow, Kiama, New South Wales.	H. P. White.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII (1), p. 32, 1905.	Olivine basalt.	Fresh?
175	'''III.5.(3)4.4'''. 2.4.1'''.2''.	or 5.56 di 4.26 ab 19.91 ol 26.07 an 29.47 mt 3.25 ne 2.56 il 4.26 ap 1.68	Woodlands, Mittagong, New South Wales.	D. Mawson.	Taylor and Mawson, Pr. R. Soc. N. S. W., XXXVII, p. 341, 1903.	Basalt.	
176	(II)III.(4)5.''4.4(5). 1.1.1.2.	Q 6.84 di 4.67 or 3.89 hy 30.70 ab 20.96 mt 1.86 an 25.85 il 1.67	Nullagine, Pilbara, West Australia.	Not stated.	A. G. Maitland, W. Aust. G. S. B. 20, p. 32, 1905.	Diabase.	Fresh?
177	(II)III.5.''4.4(5). 1.1.2.2.	or 3.89 di 17.67 ab 24.63 hy 17.48 an 32.25 ol 0.48 mt 2.55 il 1.22	Norseman, West Australia.	E. S. Simpson.	W. D. Campbell, W. Aust. G. S. B. 21, p. 119, 1906.	Norite.	
178	III.5.4'''.5. 1.1.2.2.	or 0.56 di 27.15 ab 13.82 hy 14.24 an 39.20 ol 2.57 mt 1.39	Norseman, West Australia.	E. S. Simpson.	W. D. Campbell, W. Aust. G. S. B. 21, p. 119, 1906.	Norite.	
179	III.5.''4.4(5). 1'''.3.2.3.	or 3.89 di 20.72 ab 21.48 hy 5.04 an 25.58 ol 17.05 mt 1.86 il 2.28	Norseman, West Australia.	E. S. Simpson.	W. D. Campbell, W. Aust. G. S. B. 21, p. 119, 1906.	Dolerite.	
180	III.''5.4(5).(4)5. 1.1.2.2.	Q 3.18 di 26.26 or 1.11 hy 22.64 ab 8.91 mt 2.78 an 32.80 il 0.76 ap 0.34	Somerville, Kalgoorlie, West Australia.	H. Bowley.	E. S. Simpson, W. Aust. G. S. B. 42 (1), p. 61, 1912.	Epidiorite.	
181	III.5.4.5.⊙ 1.2.2.2.	or 0.56 di 26.91 ab 16.77 hy 13.42 an 31.41 ol 7.38 mt 2.32 il 0.46	Cue, West Australia.	E. S. Simpson.	C. G. Gibson, W. Aust. G. S. B. 14, p. 15, 1904.	Norite.	
182	III.5.(3)4.4'''. ''2.1.2.3.	or 4.45 di 15.65 ab 23.06 hy 18.50 an 28.41 ol 4.06 mt 2.09 il 3.65 ap 1.34	Irregularly Creek, Ashburton Gold- field, West Australia.	Not stated.	J. A. Thompson in A. G. Maitland, W. Aust. G. S. B. 33, p. 164, 1909.	Quartz dolerite.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
183	49.06	14.30	3.14	9.13	6.05	10.86	2.38	0.18	1.71	0.10	1.40	0.32	0.46	CO ₂ none ZrO ₂ 0.02 FeS ₂ 0.56 Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.25 BaO 0.03	99.97	3.04
A1. I	.818	.140	.020	.126	.151	.194	.039	.002			.018	.002	.007			
184	48.86	13.47	2.18	8.92	7.65	12.19	2.58	0.19	1.51	0.04	1.49	0.11	0.90	CO ₂ none ZrO ₂ none FeS ₂ 0.17 Cr ₂ O ₃ 0.06 V ₂ O ₅ 0.08 BaO 0.01	100.41	3.08
A1. I	.814	.132	.014	.124	.191	.218	.042	.002			.019	.001	.013			
185	52.49	16.44	2.60	5.30	6.18	11.71	2.06	1.09	1.42	0.15	0.62	trace	trace		100.06	
A3. III	.875	.161	.016	.074	.155	.209	.033	.012			.008	—	—			
186	50.82	16.58	0.44	8.27	8.31	7.80	2.34	1.89	1.89		1.12		0.25	CO ₂ 0.35 Cr ₂ O ₃ 0.08	100.14	
A2. II	.847	.163	.003	.115	.208	.139	.038	.020			.014		.004			
187	50.07	13.32	1.92	9.28	8.01	10.64	2.16	0.45	0.49	0.22	2.70	0.26	0.16	CO ₂ none ZrO ₂ trace SO ₃ none Cl 0.08 F none S 0.11 Cr ₂ O ₃ 0.05 V ₂ O ₅ none NiO 0.04 BaO none SrO trace CuO none MoO ₃ trace	99.96	
A1. I	.835	.131	.012	.129	.200	.190	.035	.005			.034	.002	.002			
188	50.03	12.10	2.10	9.97	9.57	10.58	2.01	0.44	0.32	0.16	2.57	0.21	0.16		100.22	
A2. II	.834	.119	.013	.139	.239	.189	.032	.005			.032	.001	.002			
189	49.20	14.90	4.51	12.75	3.90	9.20	1.96	0.95	0.10		1.72	0.42	0.28		99.89	
A2. II	.820	.146	.028	.177	.098	.164	.032	.010			.021	.003	.004			
190	48.82	15.22	5.72	9.65	4.55	10.40	2.10	0.90	none		1.16	trace	0.67		99.19	3.01
B2. III	.814	.149	.036	.134	.114	.186	.034	.010			.015	—	.010			
191	48.99	13.73	1.60	10.46	13.53	7.34	1.62	0.27	0.27	0.10	1.73	0.13	0.20	CO ₂ 0.24 ZrO ₂ none SO ₃ none S 0.04 Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.06 NiO 0.05 BaO trace? SrO none Li ₂ O none	100.38	
A1. I	.817	.134	.010	.145	.338	.131	.026	.003			.022	.001	.003			
192	45.48	11.87	1.98	9.87	13.28	10.97	2.21	0.77	0.74	0.23	1.90	0.25	0.16	CO ₂ none ZrO ₂ none FeS ₂ 0.03 Cr ₂ O ₃ 0.08 V ₂ O ₅ 0.04 NiO 0.04 BaO 0.04 Li ₂ O none	99.94	
A1. I	.758	.117	.013	.137	.332	.196	.035	.008			.024	.002	.002			
193	44.75	13.22	1.20	10.50	10.85	11.50	1.95	1.27	1.62		3.45	0.38			100.71	
A2. II	.740	.130	.008	.146	.271	.205	.032	.014			.043	.003			(100.69)	
194	43.98	17.69	5.97	6.68	7.83	11.71	1.34	0.64	1.77	0.95	1.20	0.32	trace	CO ₂ trace Cl trace S none Cr ₂ O ₃ 0.05 BaO none SrO none	100.13	2.95
A1. I	.733	.173	.038	.093	.196	.209	.022	.007			.015	.002	—			
195	54.17	14.90	1.09	7.75	10.66	8.79	1.27	0.54	0.53	0.17	0.64	trace	0.15	CO ₂ trace	100.65	
A2. II	.903	.146	.007	.108	.267	.157	.020	.006			.008	—	.002			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
183	III.5.4.5.⊙ 2.1.2.3.	Q 2.40 di 20.10 or 1.11 hy 17.75 ab 20.44 mt 4.64 an 27.52 il 2.74 ap 0.67	Somerville, Kalgoorlie, West Australia.	H. Bowley.	Simpson and Gibson, W. Aust. G. S. B. 42, p. 61, 1912.	Quartz epidiorite.	
184	III.5.4.5. 2.2.2.3.	or 1.11 di 28.87 ab 22.01 hy 8.00 an 24.46 ol 7.81 mt 3.25 il 2.89 ap 0.34	Boulder, Kalgoorlie, West Australia.	H. Bowley.	Simpson and Gibson, W. Aust. G. S. B. 42, p. 61, 1912.	Epidicrite.	MnO high.
185	(II)III.5.4.4. 2.1.2.2''.	Q 4.50 di 20.83 or 6.67 hy 12.06 ab 17.29 mt 3.71 an 32.25 il 1.22	Launceston, Tasmania.	M. Dittrich.	A. Osann, N. J. Cb., 1907, p. 710.	Diabase.	
186	(II)III.5.(3)4.(3)4. 1''2.1''2(3).	or 11.12 di 7.69 ab 19.91 hy 18.36 an 29.19 ol 8.85 mt 0.70 il 2.13	Supply Creek, Mikonui, New Zealand.	J. S. MacLaurin.	P. G. Morgan, N. Z. G. S. B. 6, p. 141, 1908.	Hornblende camptom- nite.	
187	III.5.4.(4).5. 2.1.2.(2)3.	Q 2.16 di 20.83 or 2.78 hy 21.06 ab 18.34 mt 2.78 an 25.30 il 5.17 ap 0.67	Halemaumau, Kilauea, Hawaii, Hawaiian Islands.	J. B. Ferguson.	Day and Shepherd, B. G. S. A., XXIV, p. 586, 1913.	Basalt.	Also cf. J. B. Fergu- son, A. J. S., XXXVII, p. 400, 1914.
188	III.5.4.4(5). 2.1.2.2.	Q 0.54 di 23.42 or 2.78 hy 25.21 ab 16.77 mt 3.02 an 22.80 il 4.86 ap 0.54	Crater, Kilauea, Hawaii, Hawaiian Islands.	G. Steiger.	W. Cross, U. S. G. S. P. P. 88, p. 48, 1915.	Basalt.	Fragment in tuff.
189	III.5.4.4. 2.1.2.4.	Q 4.80 di 11.73 or 5.56 hy 21.30 ab 16.77 mt 6.50 an 28.91 il 3.19 ap 1.01	Lava of May, 1883, Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 135, 1888.	Basalt.	In W. T., p. 337.
190	III.5.4.4.⊙ 2.1.2.3.	Q 3.12 di 18.65 or 5.56 hy 14.42 ab 17.82 mt 8.35 an 29.19 il 2.28	Crater, Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 185, 1888.	Basalt.	MgO low? In W. T., p. 337.
191	III.5.4.(4).5. 1.2.1.2.	or 1.67 di 5.16 ab 13.62 hy 37.08 an 29.19 ol 6.90 mt 2.32 il 3.34 ap 0.34	Olokele Canyon Kauai Island, Hawaiian Islands.	W. T. Schaller.	W. Cross, U. S. G. S. P. P. 88, p. 11, 1915.	Basalt.	
192	III.5.4.(3)4.4''. 2.3.2.2.	or 4.45 di 25.70 ab 13.36 ol 24.73 an 20.57 mt 3.02 ne 2.70 il 3.65 ap 0.67	Makaweli Canyon, Kauai, Hawaiian Islands.	W. F. Hille- brand.	W. Cross, U. S. G. S. P. P. 88, p. 11, 1915.	Basalt.	
193	III.5.4.(3)4.4. 2.3.2.2.	or 7.78 di 24.88 ab 10.48 ol 19.99 an 23.35 mt 1.86 ne 3.41 il 6.54 ap 1.01	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 118, 1910.	Olivine basalt.	
194	III.5.4.4. 2.1.1.2.2''.	or 3.89 di 12.85 ab 11.53 hy 13.90 an 40.03 ol 3.48 mt 8.32 il 2.28 ap 0.67	Fatmalapa, Efate, New Hebrides.	D. Mawson.	D. Mawson, Pr. Linn. Soc. N. S. W., XXX, p. 470, 1905.	Basalt.	
195	III.(4)5.4.4. 1.1.1.2.	Q 6.48 di 8.31 or 3.34 hy 35.22 ab 10.48 mt 1.62 an 33.36 il 1.22	Cape Royds, Ross Island, S. Victoria Land, Antarctica.	W. N. Benson.	W. N. Benson, pers. com.	Quartz dolerite.	Erratic block.

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC. AUVERGNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
196	54.16	15.08	0.79	8.08	7.14	10.57	1.60	1.11	0.36	0.20	0.70	trace	0.14	CO ₂ trace	99.93	
A2. II	.903	.148	.005	.113	.179	.189	.026	.012			.009	—	.002			
197	53.26	15.64	0.24	7.44	8.64	12.08	1.25	0.58	0.41	0.35	0.70	0.04	0.11		100.74	
A2. II	.888	.153	.002	.103	.216	.216	.020	.006			.009	—	.002			

RANG 5. PERCALCIC. KEDABEKASE. (C. I. P. W., 1902.)

1	40.68	19.83	4.68	6.49	7.67	17.64	1.10	0.27	0.27	0.08	2.04		0.10		100.85	3.14
A2. II	.678	.194	.029	.090	.192	.315	.018	.003			.026		.001			
2	46.69	14.23	2.00	12.86	8.15	13.32	0.98	none	0.08		1.28	0.19	0.11	S 0.12	99.97	3.24
A2. II	.778	.139	.013	.179	.204	.238	.016	—			.016	.001	.002			
3	48.02	20.01	1.13	7.29	10.05	11.42	0.51	0.05	0.57	0.10	0.23	trace	0.18	CO ₂ 0.25 ZrO ₂ none FeS ₂ 0.11 Cr ₂ O ₃ 0.03 V ₂ O ₅ 0.02 NiO 0.01 BaO none SrO none	99.98	2.980
A1. I	.800	.196	.007	.101	.251	.203	.008	.001			.003	—	.003			
4	46.85	20.02	2.30	4.60	10.16	13.84	1.32	trace	0.88		0.30	trace	trace		100.27	2.996
A3. III	.781	.196	.014	.064	.254	.247	.021	—			.004	—	—			
5	44.76	18.82	2.19	4.73	11.32	14.58	0.89	0.11	2.36	0.17	0.13	none	0.15	Cr ₂ O ₃ 0.03 Li ₂ O trace	100.29	
A2. II	.746	.184	.014	.065	.283	.260	.014	.001			.002	—	.002			
6	46.36	16.88	2.23	6.29	8.15	15.66	1.17	0.10	1.48	0.21	1.29	trace	0.10	CO ₂ none ZrO ₂ none S 0.01 BaO none SrO none	99.93	
A1. I	.773	.165	.014	.088	.204	.280	.019	.001			.016	—	.001			
7	44.60	15.38	8.50	8.03	6.82	14.50	0.33	0.01	0.56		0.92				99.65	3.059
A3. III	.743	.151	.053	.111	.171	.259	.005	—			.012					
8	50.76	16.83	4.16	4.45	10.09	11.30	0.97	0.06	0.14		0.46	none	0.69	CO ₂ none S none CoO trace	99.91	
A2. II	.846	.165	.026	.062	.252	.202	.016	.001			.006	—	.010			
9	49.06	18.87	1.89	4.49	10.95	11.70	0.97	0.06	0.43		0.88	trace	0.34	FeS ₂ 0.02	99.66	
A2. II	.818	.185	.012	.063	.274	.209	.016	.001			.011	—	.005			
10	42.20	17.56	1.20	6.23	20.38	9.61	1.11	0.11	1.13	0.06	0.09		0.18	CO ₂ trace S 0.02 Cr ₂ O ₃ 0.06 NiO 0.13 CuO 0.04	100.21	
A1. I	.703	.172	.008	.088	.508	.171	.018	.001			.001		.003			
11	47.40	16.29	1.57	5.55	8.13	17.57	0.71	0.51	0.87	0.05	0.50	0.58		CO ₂ 0.07 SO ₃ 0.49	100.34	
A2. II	.790	.160	.010	.077	.203	.314	.011	.005			.006	.004				
12	44.23	19.01	3.47	1.65	8.09	16.91	1.22	0.35	2.65	0.37	0.05	1.61		SO ₃ 0.35	99.96	
A2. II	.737	.186	.022	.023	.202	.302	.019	.004			—	.011				

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG 4-5. PRESODIC. AUVERGNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
196	III.(4)5.4.4". 1.1.2.2.	Q 5.76 di 17.96 or 6.67 hy 22.44 ab 13.62 mt 1.16 an 30.58 il 1.37	Cape Royds, Ross Island, S. Victoria Land, Antarctica.	W. N. Benson.	W. N. Benson, pers. com.	Quartz dolerite.	Erratic block.
197	III."5.4".4. 1.1.2.2.	Q 4.74 di 20.08 or 3.34 hy 24.24 ab 10.48 mt 0.46 an 35.31 il 1.37	Knob Head, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 137, 1907.	Dolerite.	

SUBRANG. NOT NEEDED.

1	III.5(6).(4)5.0. 2.2.2.2.	an 48.09 di 21.89 lc 1.31 ol 9.77 ne 5.11 cs 3.78 mt 6.73 il 3.95	Rougemont, Rouville County, Quebec.	M. F. Connor.	J. J. O'Neil, Can. G. S. Mem. 43, p. 76, 1914.	Rougemont- ite (augite anorthosite).	
2	III.5.(4)5.0. 1.1.2.2.	ab 8.38 di 25.73 an 34.19 hy 20.46 ol 5.34 mt 3.02 il 2.43 ap 0.34	Sudbury District, Ontario.	J. A. Horton.	A. P. Coleman, J. G., XV, p. 775, 1907.	Norite.	
3	III.5.5.0. 1.1.1.2.	Q 0.66 di 3.59 or 0.56 hy 35.78 ab 4.19 mt 1.62 an 61.99 il 0.46	McKinsey's mill, Cecil County, Maryland.	W. F. Hille- brand.	A. G. Leonard, A. G., XXVIII, p. 151, 1901.	Norite.	In W. T., p. 337.
4	III.5.(4)5.0. 1.2.2.2.	ab 11.00 di 15.90 an 48.65 hy 9.85 ol 10.05 mt 3.25 il 0.61	Pikesville, Baltimore County, Maryland.	L. McCay.	G. H. Williams, U. S. G. S. B. 28, p. 37, 1886.	Gabbro- diorite.	In W. T., p. 337.
5	III.5."5.0. 1.3.2.2.	or 0.56 di 20.11 ab 7.34 hy 3.03 an 46.98 ol 16.04 mt 3.25 il 0.30	Wetheredville, Baltimore County, Maryland.	W. F. Hille- brand.	G. H. Williams, U. S. G. S. A. R. 15, p. 673, 1895.	Hypersthene gabbro.	In W. T., p. 337.
6	III.5.(4)5.0. 1.2.2.2.	or 0.56 di 30.12 ab 9.96 hy 6.22 an 40.31 ol 5.41 mt 3.25 il 2.43	Riddle's quad- rangle, Oregon.	G. Steiger.	G. F. Kay, U. S. G. S. B. 419, p. 167, 1910.	Dioritic greenstone.	
7	III.(4)5.5.0. 2.1.2.2.	Q 5.46 di 25.18 ab 2.62 hy 11.10 an 40.59 mt 12.30 il 1.82	Beef Island, West Indies.	P. Peterson.	P. T. Cleve, Sv. Vet. Ak. Hdl., IX, No. 12, p. 38, 1871.	Olivine gabbro.	Cf. A. G. Hog- bom, B. G. Inst. Ups., VI, p. 230, 1905.
8	III."5.(4)5.0. 2.1.2.2.	Q 6.24 di 11.88 or 0.56 hy 24.86 ab 8.38 mt 6.03 an 41.14 il 0.91	Arakaka District, Barima River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., II, p. 6, 1898.	Diabase.	In W. T., p. 337.
9	III.5."5.0. 1.1.1.2.	Q 1.20 di 9.05 or 0.56 hy 29.05 ab 8.38 mt 2.78 an 46.70 il 1.67	Issorora Hill, Aruka River, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Br. Gui., p. 48, 1908.	Epidiorite.	
10	III.5.(4)5.0. 1.5.1.2.	or 0.56 di 3.95 ab 4.19 ol 42.60 an 42.53 mt 1.86 ne 2.84 il 0.15	Allival, Rum Island, Scotland.	W. Pollard.	A. Harker, G. S. Scot., Mem. Sh. 60, p. 80, 1908.	Allivalite.	
11	III.5.(4)5.0. 1.1.3.2.	or 2.78 di 35.00 ab 5.76 hy 8.24 an 40.03 ol 2.42 mt 2.32 il 0.91 ap 1° 4	Lohberg, n. Nieder Ram- stadt, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rosdorf, p. 29, 1912.	Gabbro.	
12	III.5.(4)5.0. 2.2.3.1.	or 2.22 di 22.06 ab 9.96 hy 3.70 an 45.31 ol 4.48 mt 5.10 ap 3.70	Felsberg, Hesse.	Surv. lab.	C. Chelius, Erl. G. Kt. Hes., Bl. Neunkirchen, p. 19, 1901.	Diorite.	TiO ₂ and P ₂ O ₅ interchanged?

CLASS III. SALFEMANE—Continued.

RANG 5. PERCALCIC. KEDABEKASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13	42.38	17.31	7.69	6.61	3.62	19.01	0.83	trace	0.91		1.95				100.31	3.260
A3. III	.706	.170	.048	.092	.091	.339	.013	—			.024					
14	34.68	17.94	11.47	5.71	12.52	14.82	0.35	0.23	1.00		0.82				99.54	
A3. III	.578	.178	.072	.079	.313	.264	.006	.002			.010					
15	43.43	14.71	2.23	12.45	7.88	17.65	0.10	0.08	1.10	0.17	0.07	0.02			99.89	
A2. II	.724	.144	.014	.173	.197	.315	.002	.001			.001	—				
16	46.09	12.76	2.65	4.50	14.42	16.65	0.60	none	2.43		0.45				100.55	
A3. III	.768	.125	.017	.063	.361	.297	.010	—			.006					
17	51.55	18.85	0.32	6.77	7.09	14.04	0.63	0.08	0.11	0.04	0.53	trace	0.13	CO ₂ none S none	100.14	
A2. II	.859	.185	.002	.094	.177	.251	.010	.001			.007	—	.002			
18	35.34	13.36	6.24	5.18	6.61	27.34	—	none	4.03		1.54			CO ₂ none Cr ₂ O ₃ none NiO 0.02 CuO 0.05	99.71	
A2. II	.589	.131	.039	.072	.165	.488	—	—			.019					
19	33.42	14.34	10.32	2.44	4.66	29.40	0.14		3.63		0.30		0.75	CO ₂ none Cr ₂ O ₃ none	99.40	
A2. II	.557	.141	.064	.034	.117	.525	.002				.004		.011			
20	50.47	14.92	1.33	5.10	17.69	9.07	0.75	0.18	0.92		0.14	0.02	0.12		100.71	
A2. II	.841	.146	.008	.071	.442	.163	.012	.002			.002	—	.002			

CLASS III. SALFEMANE.

RANG 1. PERALKALIC. WYOMINGASE. (C. I. P. W., 1902.)

1	50.23	11.22	3.34	1.84	7.09	5.99	1.37	9.81	1.72	0.93	2.27	1.89	0.05	SO ₃ 0.74 Cl 0.03 F 0.50 Cr ₂ O ₃ 0.10 BaO 1.23 SrO 0.24 Li ₂ O trace (Ce,Di) ₂ O ₃ 0.03	100.62	2.779
A1. I	.837	.110	.021	.025	.177	.107	.023	.104			.028	.013	—			

RANG 1. PERALKALIC. WYOMINGASE.

1	48.90	7.85	11.46	13.32	0.38	1.95	7.40	3.23	1.80			none	1.11	ZrO ₂ 1.96 Cl 0.03	99.39	3.12
B2. III	.815	.077	.072	.185	.010	.035	.119	.034				—	.015			
2	47.88	12.10	3.53	4.80	8.64	9.35	2.94	5.61	1.52	0.70	0.77	1.11	0.15	CO ₂ 0.12 ZrO ₂ 0.03 SO ₃ none Cl trace F 0.05 S 0.03 Cr ₂ O ₃ 0.04 V ₂ O ₅ 0.04 NiO trace BaO 0.46 SrO 0.13 Li ₂ O none	100.00	
A1. I	.798	.119	.022	.067	.216	.167	.047	.060			.010	.003	.002			

ORDER 5. PERFELIC. GALLARE—Continued.

SUBRANG. NOT NEEDED—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	III.5.5.0. 2.1.3.3.	Q 1.26 di 24.62 ab 6.81 wo 8.24 an 43.65 mt 11.14 il 3.65	Schwarzbrunn, n. Gablonz, Bohemia.	R. Reinisch?	R. Reinisch. T. M. P. M., XXV, p. 536, 1906.	Augite.	Border of dike. Cf. No. 3, III.8.3.4.
14	III.5.5.0.⊙ 2.5.2.2.	an 47.26 di 3.24 lc 0.87 ol 20.86 ne 1.70 cs 6.88 mt 16.01 il 1.52 hm 0.48	Ostraia Sopka, Tschistop Moun- tains, Ural Mountains.	Not stated.	L. Duparc, B. Soc. Min. Fr., XXXV, p. 20, 1913.	Ostraite (spinel pyroxenite).	
15	III.5.5.0. 1.2.2.3.	an 39.20 di 39.15 lc 0.44 ol 15.57 ne 0.57 cs 0.34 mt 3.25 il 0.15	Insizwa, Mount Ayliff, Griqualand.	W. Versfeld.	A. L. Du Toit, A. R. G. Com. Cape G. H., XV, p. 126, 1910.	Augite picrite.	
16	III(IV).5.5.0. 1.2.2.2.	ab 5.24 di 39.89 an 31.97 hy 0.93 ol 15.37 mt 3.94 il 0.91	Torricelli Moun- tains? Kaiser Wilhelm Land, New Guinea.	E. Ludwig.	S. Richarz, N. J. B. B., XXIX, p. 445, 1910.	Hornblende gabbro.	Pebble at Tumleo.
17	(II)III(4)5.5.0. 1.1.2.2.	Q 6.24 di 17.43 or 0.52 hy 20.68 ab 5.24 mt 0.46 an 48.37 il 1.06	Cavanagh Range, West Australia?	G. J. Burrows.	J. A. Thompson, Pr. R. Soc. N. S. W., XLV, p. 308, 1912.	Diabase.	
18	III(IV).5.5.0. 2.4.3.2.	an 36.42 di 12.90 ol 8.69 CS 25.63 mt 9.05 il 2.89	Roding River, Dun Mountains, Nelson, New Zealand.	J. S. MacLaurin.	J. M. Bell, N. Z. G. S. B. 12, p. 33, 1911.	Rodingite (diplage garnet rock).	
19	III.5.5.0. 2.5.4.0.	an 38.64 di 5.18 ne 0.57 ol 6.58 CS 31.13 mt 9.51 il 0.61 hm 3.68	Lee Valley, Dun Mountains, Nelson, New Zealand.	J. S. MacLaurin.	J. M. Bell, N. Z. G. S. B. 12, p. 33, 1911.	Rodingite.	
20	III.5(4)5.0. 1.1.1.2.	or 1.11 di 7.03 ab 6.29 ol 6.06 an 36.70 mt 1.86 il 0.30	New Caledonia.	Boiteau.	A. Lacroix, C. R., CLII, p. 819, 1911.	Norite.	

ORDER 6. LENDOFELIC. PORTUGARE. (C. I. P. W., 1902.)

SUBRANG 1. PERPOTASSIC. WYOMINGOSE. (C. I. P. W., 1902.)

1	(II)III(5)6.1.1. (2). 2.2.2.1.	or 50.60 ac 3.70 lc 5.67 di 15.34 ne 1.70 ol 7.42 th 1.28 il 5.80 hm 2.08 pf 0.41 ap 4.37	Boar's Tusk, Leucite Hills, Wyoming.	W. F. Hille- brand.	W. Cross, A. J. S., IV, p. 130, 1897.	Wyomingite.	In W. T., p. 339.
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SUBRANG 3. SODIPOTASSIC. MONTANOSE. (L. V. PIRSSON, 1905.)

1	III(IV).6.1.3. 1.2.2.5.4.	or 18.90 ac 33.26 ab 7.86 ns 0.49 ne 7.95 di 8.68 Z 2.93 ol 17.75	Kringlerne, Kangerdluarsuk, Ilhimausak Region, Greenland.	C. Detlefsen.	N. V. Ussing, G. Juhl., p. 182, 1911.	Kakortokite (black).	In W. T., p. 339.
2	III.6.1(2).3. 2.2.2.2.	or 32.53 di 28.91 an 3.34 ol 9.12 lc 0.66 mt 5.10 ne 13.35 il 1.52 ap 2.69	Shonkin Sag, Highwood Mountains, Montana.	W. F. Hille- brand.	Weed and Pirsson, A. J. S., XII, p. 14, 1901.	Shonkinite.	Also in U. S. G. S. B. 237, p. 113, 1905.

CLASS III. SALFEMANE—Continued.

RANG 1. PERALKALIC. WYOMINGASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	50.70	13.72	6.07	7.64	0.04	0.86	12.32	1.91	4.84				1.42	ZrO ₂ 1.04	100.56	
A2. II	.845	.134	.038	.106	.001	.015	.198	.020					.020			
2	51.88	14.13	6.45	0.94	3.44	10.81	6.72	4.57	0.18		0.33	0.96			100.41	
A2. II	.865	.138	.040	.013	.086	.193	.108	.049			.004	.007				
3	48.39	11.64	4.09	3.57	12.55	7.64	4.14	3.24	2.56	0.28	0.73	0.45	trace	CO ₂ none SO ₃ 0.08 Cl trace Cr ₂ O ₃ 0.07 NiO none BaO 0.32 SrO 0.15 Li ₂ O trace		
A1. I	.807	.114	.025	.049	.314	.137	.067	.034			.009	.003	—			
4	45.72	14.25	4.10	5.56	2.67	10.41	5.52	3.62	4.80		3.25	0.20			100.10	2.766
A2. II	.762	.140	.026	.077	.067	.186	.089	.038			.041	.001				
5	51.35	11.45	9.40	2.41	0.54	3.27	10.80	2.52	3.20		2.75		1.25	ZrO ₂ 0.54	99.48	
A2. II	.856	.112	.059	.033	.014	.059	.174	.027			.034		.018			

RANG 2. DOMALKALIC. MONCHIQUESE. (C. I. P. W., 1902.)

1	46.04	12.40	3.54	5.58	12.60	8.38	1.62	4.87	3.55		2.20				100.78	
A3. III	.767	.122	.022	.078	.315	.150	.026	.052			.028					

RANG 2. DOMALKALIC. MONCHIQUESE.

1	49.59	14.51	3.51	5.53	6.17	9.04	3.52	5.60	1.95		0.36	0.15	trace	SO ₃ 0.02 Cl 0.13 BaO 0.49 SrO 0.21	100.78	
A1. I	.827	.142	.022	.076	.154	.160	.056	.060			.005	.001	—			
2	46.73	10.05	3.53	8.20	9.27	13.22	1.81	3.76	1.24		0.78	1.51	0.28	Cl 0.18	100.56	
A2. II	.779	.099	.022	.114	.232	.236	.030	.040			.010	.011	.004			
3	48.98	12.29	2.88	5.77	9.19	9.65	2.22	4.96	0.56	0.26	1.44	0.98	0.08	F Cr ₂ O ₃ 0.22 BaO trace SrO 0.43 0.08	99.99	
A1. I	.816	.120	.018	.081	.230	.172	.035	.053			.018	.007	.001			
4	48.81	16.64	2.65	6.28	6.15	9.87	2.85	5.79	0.05		1.01	0.66		Cl 0.34	101.10	
B2. III	.814	.163	.017	.088	.154	.177	.046	.082			.013	.005				
5	49.65	14.39	4.21	3.48	6.27	10.12	3.21	5.46	2.37		0.25	0.79	0.25		100.19	
A2. II	.828	.141	.026	.049	.157	.180	.051	.059			.003	.008	.004			
6	46.30	9.87	7.43	5.40	7.18	14.26	1.74	3.81	1.85		1.37	1.01	trace		100.22	3.011
A2. II	.772	.097	.046	.075	.180	.255	.028	.040			.016	.007	—			

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBBRANG 4. DOSODIC. PILANDOSE. (H. S. WASHINGTON, 1914.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	(II)III.6''1.4(5). 1.2.1.5.3.	or 11.12 ac 17.56 ab 26.72 ns 5.73 ne 17.89 di 3.72 Z 1.65 ol 11.39	Kangerdluarsuk, Greenland.	C. Detlefsen.	H. Rosenbusch, Elem. Gest., p. 215, 1898.	Arivedsonite- analcite tinguaite.	Not in N. V. Ussing, G. Julhb. In W. T., p. 339.
2	III.6(7).1.(3)4. 2.1.3.2.	or 27.24 ac 8.78 ab 7.86 di 18.38 ne 21.02 wo 9.74 mt 2.09 il 0.61 hm 1.92 ap 2.35	Pooh-bah Lake, Rainy River District, Ontario.	W. C. Blasdale.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 356, 1896.	Garnet- pyroxene malignite.	In W. T., p. 347.
3	III.6.1''4. ''(2)3.2.(1)2.	or 18.90 di 24.78 ab 14.15 ol 15.37 an 3.61 mt 5.80 ne 11.36 il 1.37 ap 1.01	Bandbox Mountain, Little Belt Mountains, Montana.	W. F. Hille- brand.	L. V. Pirsson, U. S. G. S. A. R. 20 (III), p. 545, 1900.	Analcite basalt.	In W. T., p. 339.
4	''III.6(7).1''4. 2.1.3.3.	or 21.13 di 16.95 ab 10.48 wo 11.14 an 3.61 mt 6.03 ne 19.60 il 6.23	Fohberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L.-A., IV, p. 115, 1901.	Monchiquite.	In W. T., p. 339
5	III.6.1.4.⊙ 1.1.2.5.4.	or 15.01 ac 27.26 ab 21.48 ns 3.66 ne 12.50 di 7.24 Z 0.73 wo 3.25 il 5.17	Tusschenkomst, Pilandsberg, Transvaal.	F. Pisani.	H. A. Brouwer, C. R., CXLIX, p. 1008, 1909.	Lujavrite.	Also in Transv. Nephsy., p. 130, 1910.

SUBBRANG 2. DOPOTASSIC. KAJANOSE. (H. A. BROUWER, 1909.)

1	III.6.2(3).2''. 2.3.2.2.	or 24.46 di 23.19 an 12.23 ol 17.20 lc 3.49 mt 5.10 ne 7.38 il 4.26	Oeloe Kajan, East Borneo.	Pisani.	H. A. Brouwer, Pr. K. Ak. Wet. Amst., XII (I), p. 151, 1909.	Mica-leucite basalt.	
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SUBBRANG 3. SODIPOTASSIC. SHONKKIOSE. (C. I. P. W., 1902.)

1	''III.6.''2.3. 2.2.2.2.	or 33.36 di 29.32 ab 0.52 ol 5.58 an 7.23 mt 5.10 ne 15.62 il 0.76 ap 0.34	East Peak, Highwood Mountains, Montana.	E. B. Hurlbut.	L. V. Pirsson, U. S. G. S. B. 237, p. 109, 1905.	Leucite shonkinite.	In W. T., p. 341.
2	III(IV).6.2.''3. 2.2.2.2''.	or 22.24 di 38.19 ab 1.05 ol 11.54 an 8.06 mt 5.10 ne 7.95 il 1.67 ap 3.70	Square Butte, Highwood Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, B. G. J. A., VI, p. 414, 1895.	Shonkinite.	Corrected in L. V. Pirsson, U. S. G. S. B. 237, p. 102, 1905. In W. T., p. 341.
3	III(5).6.2.(2)3. 2.2.2.2.	or 29.47 di 26.56 ab 6.02 ol 11.75 an 8.90 mt 4.18 ne 6.97 il 2.74 ap 2.35	Yogo Peak, Little Belt Mountains, Montana.	W. F. Hille- brand.	Weed and Pirsson, A. J. S., L, p. 474, 1895.	Shonkinite.	Also in U. S. G. S. A. R. 20 (III). p. 484, 1900. In W. T., p. 341.
4	(II)III.6''2''''3. 2.2.2.2.	or 26.13 di 24.50 an 15.29 ol 8.11 lc 6.54 mt 3.94 ne 13.06 il 1.98 ap 1.68	Lava of 1906, Mount Vesuvius. Italy.	Pisani.	A. Lacroix, N. Arch. Mus. (4) IX, p. 153, 1907.	Leucite tephrite.	
5	''III.6.2.3. 2.1.3.2.	or 32.80 di 28.47 ab 3.14 ol 4.11 an 8.62 mt 6.03 ne 12.78 il 0.46 ap 2.02	Bet. Choi and Marand, n. Lake Urmia, Persia.	V. Steinecke.	V. Steinecke, Zs. Nw. Halle (4), VI, p. 12, 1887.	Leucito- phyre.	P ₂ O ₅ given as 1.08 H ₃ PO ₄ . In W. T., p. 341.
6	III(IV).''6.2.''3. 2.1.3.2.	or 22.24 di 42.11 ab 2.88 wo 1.16 an 8.06 mt 10.67 ne 6.39 il 2.43 ap 2.35	Regatta Point, Port Cygnet, Tasmania.	R. Pohl.	F. P. Paul, T. M. P. M., XXV, p. 302, 1906.	Nephelinite.	

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. MONCHIQUEASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	48.35	13.27	4.38	3.23	8.36	9.94	3.35	3.01	2.89	0.90	0.52	0.40	0.19	CO ₂ 0.30 F 0.25 Cr ₂ O ₃ trace NiO 0.04 BaO 0.54 SrO 0.09	100.01	
A1. I	.806	.130	.027	.044	.209	.177	.054	.032			.007	.003	.003			
2	47.82	13.56	4.73	4.54	7.49	8.91	4.37	3.23	3.37		0.67	1.10	trace	SO ₂ trace Cl 0.04 BaO 0.50 SrO 0.14	100.20	
A1. I	.797	.133	.029	.062	.187	.159	.071	.034			.008	.008	—			
3	45.59	12.98	4.97	4.70	8.36	11.09	4.53	1.04	3.40	0.51	1.32	0.91	0.14	ZrO ₂ 0.03 Cl 0.05 BaO 0.13 SrO 0.12 Li ₂ O trace	99.87	
A1. I	.760	.127	.031	.065	.209	.198	.072	.011			.016	.006	.002			
4	49.09	11.98	6.22	7.94	7.62	10.59	3.93	2.00	n. d.		0.58	0.50			100.45	2.33
A2. II	.818	.117	.039	.110	.191	.189	.063	.021			.007	.004				
5	46.48	16.16	6.17	6.09	4.02	7.35	5.85	3.08	4.27		0.99			CO ₂ 0.45	100.91	2.723
B3. IV	.775	.158	.039	.085	.101	.131	.095	.033			.012					
6	47.03	15.36	3.38	7.35	5.10	8.47	4.32	3.00	2.60	0.22	2.64	0.73	0.14	CO ₂ none NiO trace BaO 0.03 SrO 0.05	100.67	
A2. III	.784	.151	.021	.102	.128	.152	.069	.032			.033	.005	.002			
7	45.26	15.74	2.33	7.12	5.23	8.86	5.01	2.51	2.94	0.68	3.01	0.90	0.22	CO ₂ trace BaO none SrO trace	99.81	
A2. II	.754	.154	.015	.099	.131	.158	.081	.027			.038	.006	.003			
8	44.55	12.48	2.81	8.54	10.85	7.99	4.04	2.57	0.56	0.18	4.32	0.70		CO ₂ none SO ₂ 0.05	99.64	
A2. II	.743	.122	.018	.118	.271	.143	.065	.028			.108	.005				
9	43.64	13.12	6.40	5.52	9.36	9.52	3.89	2.18	0.49	0.16	4.55	0.74		CO ₂ none SrO 0.03	99.60	
A2. II	.727	.129	.040	.077	.234	.170	.063	.023			.057	.005				
10	45.88	13.52	2.48	7.74	9.09	8.55	4.53	2.52	0.74	0.17	2.87	1.19	0.21	CO ₂ trace Cr ₂ O ₃ 0.01 NiO 0.14	99.64	
A2. II	.765	.133	.016	.107	.227	.153	.073	.027			.036	.008	.003			
11	45.12	13.63	3.20	7.84	9.37	8.93	4.68	2.05	0.43	0.36	2.69	0.93	0.23	CO ₂ trace Cr ₂ O ₃ 0.01 NiO 0.48	99.95	
A2. II	.752	.134	.020	.109	.234	.159	.076	.022			.034	.007	.003			
12	44.66	12.97	3.84	7.55	9.35	8.82	4.24	2.78	0.69	0.48	2.76	1.10	0.20	CO ₂ none Cr ₂ O ₃ 0.01 NiO 0.26	99.71	
A2. II	.744	.127	.024	.105	.234	.157	.068	.030			.035	.008	.003			
13	43.84	12.82	8.99	5.11	2.39	13.57	3.52	2.90	3.12		3.55				99.81	2.859
A3. III	.731	.125	.056	.071	.060	.242	.056	.031			.044					
14	42.80	12.49	4.32	6.06	7.62	10.43	4.33	2.75	4.92		2.36	1.77			99.85	
A2. II	.713	.123	.027	.084	.191	.186	.069	.029			.042	.012				
15	44.39	13.12	4.19	7.38	9.54	9.55	4.17	2.22	1.96		2.40	0.93		CO ₂ 0.16 SO ₂ 0.17	100.18	
A2. II	.740	.129	.026	.103	.238	.170	.068	.023			.030	.007				

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 4. DOSODIC. MONCHIQUESE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III.(5)6.2''.(3)4. 2.2.2.2.	or 17.79 di 27.44 ab 15.46 ol 6.91 an 12.23 mt 5.26 ne 6.96 il 1.06 ap 1.01	Big Baldy Mountain, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, U. S. G. S. A. R. 20 (III), p. 548, 1900.	Analcite basalt.	In W. T., p. 341.
2	III.6.2''4. 2.2.2.2.	or 18.90 di 23.49 ab 16.77 ol 7.77 an 7.78 mt 6.73 ne 11.08 il 1.22 ap 2.69	Highwood Gap, Highwood Mountains, Montana.	H. W. Foote.	L. V. Pirsson, U. S. G. S. B. 237, p. 156, 1905.	Analcite basalt (monchiquite).	In W. T., p. 341.
3	III.6.2''4(5). 2.2.2.2.	or 6.12 di 29.32 ab 19.12 ol 9.76 an 12.23 mt 7.19 ne 10.08 il 2.43 ap 2.02	The Basin, n. Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, J. G., V, p. 689, 1897.	Analcite basalt.	In W. T., p. 341.
4	III.(5)6.2.4. 2.2.2.2.	or 11.68 di 32.11 ab 20.96 ol 8.67 an 9.17 mt 9.05 ne 6.53 il 1.37 ap 1.34	Santa Maria, n. Atlitxco, Puebla, Mexico.	A. Hoppe.	A. Hoppe in Felix and Lenk, Btr. G. Mex., II, p. 220, 1899.	Vitrophyric basalt.	In W. T., p. 341.
5	(II)III.6''2.4. 2.1.2.3.	or 18.35 di 22.65 ab 14.15 ol 2.64 an 8.34 mt 9.05 ne 19.31 il 1.82	Cabo Frio, n. Rio de Janeiro, Brazil.	M. Hunter.	Hunter and Rosenbusch, T. M. P. M., XI, p. 454, 1890.	Monchiquite.	In W. T., p. 341.
6	(II)III.''6.2''4. 2.2.2.3.	or 17.79 di 19.13 ab 17.82 ol 7.34 an 13.90 mt 4.87 ne 9.94 il 5.02 ap 1.68	Craigleith, n. Berwick, Scotland.	W. Pollard.	E. B. Bailey, G. S. Scot. Mem. Sh. 33, p. 117, 1910.	Essexite.	
7	(II)III.6.2.4. 2.2.2.3.	or 15.01 di 20.67 ab 14.41 ol 6.93 an 12.79 mt 3.48 ne 15.19 il 5.78 ap 2.02	Bellow Water, Lugar, Ayrshire, Scotland.	A. Scott.	G. W. Tyrrell, pers. com.	Teschenite.	
8	III.6.2.4.⊙ 2.3.2.3.	or 15.57 di 21.40 ab 11.00 ol 16.42 an 8.06 mt 4.18 ne 12.50 il 8.21 ap 1.68	Llora, n. Gerona, Spain.	H. S. Washington.	H. S. Washington, A. J. S., XXIV, p. 239, 1907.	Nephelite basanite.	
9	III.6.2''4. 2.2.2.2.	or 12.79 di 23.76 ab 12.58 ol 8.68 an 11.95 mt 4.64 ne 11.08 il 8.68 hm 3.20 ap 1.68	La Garrinada, Olot, Spain.	H. S. Washington.	H. S. Washington, A. J. S., XXIV, p. 239, 1907.	Nephelite basanite.	
10	III.6.2.4.⊙ 2.3.2.2.	or 15.01 di 20.73 ab 14.15 ol 14.88 an 9.17 mt 3.71 ne 13.06 il 5.47 ap 2.69	Sverres Fjeld Volcano, Wood Bay, Spitzbergen.	M. Dittrich.	V. Goldschmidt, Skr. Vids. Krist., 1911, No. 9, p. 16.	Basalt (trachydolerite).	
11	III.6.2.4.⊙ 2.3.2.2.	or 11.95 di 22.30 ab 12.58 ol 15.20 an 10.01 mt 4.64 ne 14.77 il 5.17 ap 2.35	Sverres Fjeld Volcano, Wood Bay, Spitzbergen.	M. Dittrich.	V. Goldschmidt, Skr. Vid. Krist., 1911, No. 9, p. 16.	Basalt (trachydolerite).	
12	III.6.2.4.⊙ 2.2.2.2''.	or 16.68 di 23.12 ab 9.96 ol 13.66 an 7.51 mt 5.57 ne 13.92 il 5.32 ap 2.69	Sverres Fjeld Volcano, Wood Bay, Spitzbergen.	M. Dittrich.	V. Goldschmidt, Skr. Vid. Krist., 1911, No. p. 9, 16.	Basalt (trachydolerite).	
13	III.6.2.(3)4. 2.3.3.3.	or 17.24 di 12.96 ab 12.05 ol 16.70 an 10.56 mt 6.26 ne 9.37 il 6.69 ap 4.64	Blankerhornberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L.-A., p. 126, 1901.	Leucite basanite.	Leucite-analcite?
14	III.6''2.4. 2.2.2.2.	or 16.12 di 26.46 ab 7.86 ol 6.81 an 6.95 mt 6.28 ne 15.34 il 6.38 mt 4.03	Hertinghausen, Hesse-Nassau.	M. Dittrich.	R. Bernges, N. J. B. B., XXXI, p. 633, 1911.	Leucite basalt.	Vitrophyric. Fresh?
15	III.6.2.4.⊙ 2.2.2.2.	or 12.79 di 24.12 ab 10.74 ol 13.25 an 10.56 mt 6.03 ne 13.49 il 4.56 ap 2.35	Friedrichstollen, Meissner, Prussia.	Not stated.	F. Beyschlag, Erl. G. Kt. Pr., Bl. Allendorf, p. 47, 1886.	Basalt.	In W. T., p. 341.

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. MONCHIQUEASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16	44.87	14.05	2.03	7.79	8.87	9.76	4.65	2.31	0.62		4.71	0.27	0.07	S 0.23	100.23	
A2. II	.748	.138	.013	.108	.222	.174	.075	.024			.059	.002	.001			
17	47.83	16.09	4.32	3.62	5.53	10.68	4.46	4.05	0.24	0.05	2.27	1.33	trace	SrO none Li ₂ O none	100.47	2.858
A2. II	.797	.158	.027	.050	.138	.191	.072	.043			.028	.009	---			
18	44.52	14.28	6.36	5.39	7.13	10.20	3.76	2.59	3.53		2.04	0.56			100.36	
A2. II	.742	.140	.040	.075	.178	.182	.061	.028			.020	.004				
19	46.34	13.03	11.18	6.48	6.44	9.89	4.39	1.83	0.11		0.54		trace		100.23	
A3. III	.772	.128	.070	.090	.161	.177	.071	.020			.007		---			
20	49.78	13.37	2.16	7.51	7.61	7.95	4.72	2.37	0.34	0.08	3.11	0.72			99.71	
A2. II	.830	.131	.014	.104	.190	.142	.076	.025			.039	.005				
21	46.54	12.68	3.41	5.29	10.09	8.00	5.11	1.64	2.35	0.25	3.98	0.91			100.25	
A2. II	.772	.124	.021	.074	.252	.143	.082	.017			.050	.006				
22	40.80	14.77	7.91	7.33	5.09	11.63	4.38	2.14	1.05		3.44	0.88	trace	CO ₂ 0.05 SO ₃ trace S 0.18	99.65	3.065
A2. II	.680	.145	.049	.101	.127	.207	.071	.022			.043	.006	---			
23	48.44	16.18	1.36	6.24	7.13	8.68	5.18	3.84	1.82		1.39	0.21			100.47	
A2. II	.807	.159	.009	.087	.178	.155	.084	.040			.017	.001			(100.87)	
24	39.30	13.66	7.42	4.45	4.46	11.37	5.78	1.44	4.53		3.62	0.85	0.08	CO ₂ 0.15 SO ₃ 2.17 Cl 0.48	99.76	2.79
A2. II	.655	.134	.046	.062	.112	.203	.093	.016			.045	.006	.001			
25	44.98	15.56	5.15	7.30	3.31	9.20	5.34	1.29	3.77		2.89	0.43	0.23	S 0.04	99.49	2.947
A2. II	.750	.153	.032	.101	.083	.164	.086	.014			.036	.003	.003			
26	45.58	11.60	3.12	7.31	8.71	7.98	4.02	2.67	4.39		2.97	1.98	0.04		100.37	
A2. II	.760	.114	.019	.101	.219	.143	.065	.029			.036	.014	---			
27	42.54	11.52	7.30	7.28	8.89	9.28	4.25	1.07	4.82	0.72	1.04	0.95	0.17	CO ₂ 0.16 ZrO ₂ none SO ₃ trace Cl 0.08 S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.11 NiO none BaO 0.06 SrO trace	100.25	2.698
A1. I	.709	.113	.046	.101	.222	.166	.069	.012			.013	.007	.002			
28	43.76	11.58	4.39	7.57	12.97	9.64	3.03	1.84	0.47		3.41	0.45		CO ₂ 0.38 SO ₃ 0.14 S 0.15	99.78	3.032
A2. II	.729	.104	.028	.106	.324	.172	.048	.020			.043	.003				

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 4. DOSODIC. MONCHIQUESE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	III.6(7).2.4. 2.2.2.2.	or 13.34 di 28.23 ab 7.07 ol 9.78 an 10.84 mt 3.02 ne 17.46 il 8.97 ap 0.67	Haselbuch, Passau, Bavaria.	G. Vervuet.	A. Frentzel, Geog. Jhft., XXIV, p. 162, 1911.	Essexite.	
17	(II)III.6.2.(3)4. 2.1.2.2.	or 23.91 di 25.49 ab 8.38 ol 1.40 an 11.95 mt 5.10 ne 15.90 il 4.26 hm 0.50 ap 3.02	Falkenberg, n. Tetschen, Bohemia.	R. Pfohl.	J. E. Hibschi, T. M. P. M., XIV, p. 105, 1894.	Leucite tephrite.	In W. T., p. 343.
18	III.6.2(3)''4. 2.2.2.2.	or 15.57 di 25.68 ab 10.48 ol 4.93 an 14.18 mt 9.28 ne 11.64 il 3.95 ap 1.34	Jesserken Berg, Mittelgebirge, Bohemia.	C. F. Eichleiter.	G. Irgang, T. M. P. M., XXVIII, p. 57, 1909.	Nephelite basanite.	
19	III.6.2.4.⊙ 2.1.2.2.	or 11.12 di 30.59 ab 18.34 ol 2.44 an 10.29 mt 16.24 ne 10.22 il 1.06	Falucska, Abanytorna, Hungary.	P. Rozlozsnik.	B. V. Horvath, Jb. Ung. L.-A. (1910), p. 369, 1912.	Glaucophane diabase.	Altered?
20	''III.(5)6.2.4. 2.2.2.2.	or 13.90 di 21.16 ab 26.72 ol 11.21 an 8.34 mt 3.25 ne 7.10 il 5.93 ap 1.68	Monte Cuccurudu, n. Keremule, Sardinia.	H. S. Washing- ton.	H. S. Washington, C. R. Cong. G. Int., XII, p. 231, 1914.	Basalt.	
21	III.6.2.4''. 2.2.2.2.	or 9.45 di 21.20 ab 24.10 ol 11.05 an 6.95 mt 4.87 ol 10.22 il 7.60 ap 2.02	Bonorva, Sardinia.	H. S. Washing- ton.	H. S. Washington, B. Soc. G. It., XXXIII, p. 153, 1914.	Analcite basalt.	Also in J. G., XXII, p. 748, 1914. In refs. mol num- ber of K ₂ O= .028 norm and symbol incor- rect.
22	III.6(7).2(3).4. 3.1.3.3.	or 12.23 di 29.45 ab 4.19 mt 11.37 an 14.46 il 6.54 ne 17.89 ap 2.02	Barranco del Agua Agria, La Palma Caldera, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 399, 1912.	Essexite.	
23	''III.6(7).2.4. 1.2.2.2''.	or 22.24 di 26.23 ab 4.45 ol 9.53 an 9.73 mt 2.09 ne 21.44 il 2.58 ap 0.34	Tahiré, Rouma, Los Islands, French Guinea.	Lassieur.	A. Lacroix, N. Arch. Mus., III, p. 86, 1911.	Microther- alite.	Center of dike. Cf. No. 16, I.6.2.4.
24	III.6.2''4(5). 3.1.3.2.	or 8.90 di 24.19 ab 11.53 wo 1.39 an 16.40 mt 4.18 ne 10.51 il 6.84 hl 0.82 hm 4.48 th 3.83 ap 2.02	Etinde Volcano, Kamerun.	M. Dittrich.	E. Esch, Sb. Pr. Ak. W., 1901, p. 299.	Hauynophyre.	In W. T., p. 349.
25	(I)III.6.2(3).4(5). 2.1.2.3.	or 7.78 di 22.81 ab 23.06 ol 1.42 an 14.73 mt 7.42 ne 11.93 il 5.47 ap 1.01	Tsao-shi-err, Yingé-Men, Manchuria.	Shimidzu and Ohashi.	B. Koto, J. Col. Sci. Un. Tok., XXXII, p. 11, 1912.	Nephelite basalt.	
26	III.(5)6''2.4. 2.3.2.2.	or 16.12 di 16.84 ab 22.01 ol 14.28 an 5.56 mt 4.41 ne 6.53 il 5.47 ap 4.70	Kozaki, Bungo Province, Japan.	K. Yokoyama.	S. Kozu, pers. com.	Monchiquite.	
27	III.6.2.4(5). 2.2.2.2.	or 6.67 di 24.56 ab 17.82 ol 11.68 an 8.90 mt 10.67 ne 9.94 il 1.98 ap 2.35	South Bulli, New South Wales.	W. A. Greig.	N. S. W. Dep. Min. A. R. (1912), p. 198, 1913.	Monchiquite.	
28	III(IV).6.2(3).4. 2.3.2.2.	or 11.12 di 27.60 ab 9.43 ol 17.04 an 10.01 mt 6.50 ne 8.52 il 6.54 ap 1.01	Matavuna Volcano, Savaii, Samoa.	Heuseler.	A. Klautzsch, Jb. Pr. G. L.-A., XXVIII, p. 174, (1907), 1910.	Nephelite basalt.	Lava of 1905-6.

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. MONCHQUASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O ⁺	H ₂ O ⁻	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	44.85	12.55	3.33	5.30	10.27	8.32	4.77	0.72	2.01	0.95	5.07	1.17	0.07	NiO 0.23	99.60	
A2. II	.748	.123	.021	.074	.257	.148	.077	.008			.064	.008	.001			
2	48.90	13.80	5.77	6.84	8.85	7.27	5.32	0.96	1.65		0.71	0.04	trace	CO ₂ trace	100.11	2.803
A2. II	.815	.135	.036	.095	.221	.130	.085	.010			.009	—	—			

RANG 3. ALKALICALCIC. LIMBURGASE. (C. I. P. W., 1902.)

1	47.61	16.12	0.91	6.22	7.27	12.45	1.76	4.75	1.50		1.26	0.38			100.23	
A2. II	.794	.158	.006	.086	.182	.222	.028	.051			.016	.003			(100.38)	
2	43.98	12.28	3.49	7.70	8.00	11.19	1.33	5.06	1.61	0.12	2.24	1.81	0.51	ZrO ₂ none Cl 0.12 F 0.15 S 0.10 BaO 0.16 SrO 0.12	99.97	
A1. I	.733	.120	.022	.107	.200	.200	.021	.054			.028	.013	.007			

RANG 3. ALKALICALCIC. LIMBURGASE.

1	42.96	13.41	3.13	7.78	11.42	10.03	2.82	2.75	0.86	0.74	2.32	1.21		CO ₂ 0.42 SO ₂ 0.20	100.05	
A2. II	.716	.131	.019	.108	.286	.179	.045	.030			.029	.009				
2	46.80	14.90	2.42	9.19	7.24	11.67	2.82	2.79	0.99	0.12	1.47				100.41	3.07
A3. III	.780	.146	.015	.128	.181	.209	.045	.030			.018					
3	48.10	15.31	3.20	5.45	7.55	12.45	1.98	4.22	0.87		1.15	0.12			100.40	
A2. II	.802	.150	.020	.076	.189	.222	.032	.045			.014	.001				
4	43.69	16.08	6.95	7.02	4.55	8.87	3.34	3.75	1.48		3.59	0.80		SO ₂ 0.26	100.32	2.913
A2. II	.728	.158	.044	.097	.114	.159	.054	.040			.045	.006				
5	42.65	14.03	5.67	9.67	6.54	10.28	3.05	3.52	0.70		2.74	0.87		SO ₂ trace S 0.07	99.79	3.005
A2. II	.711	.138	.036	.135	.164	.184	.049	.037			.034	.006				

RANG 3. ALKALICALCIC. LIMBURGASE.

1	42.45	16.36	3.20	9.85	7.92	9.57	2.61	2.29	0.29	0.16	4.12	0.49		CO ₂ none S trace BaO 0.19 SrO 0.05	99.55	
A2. II	.708	.160	.020	.137	.198	.171	.042	.024			.052	.004				
2	45.11	12.44	2.67	9.36	11.56	10.61	3.05	1.01	0.78	0.16	2.34	0.51	0.22	Cl 0.11 S 0.01 V ₂ O ₅ 0.04 NiO 0.04 BaO trace SrO trace Li ₂ O none	100.02	
A1. I	.752	.122	.017	.130	.289	.189	.049	.011			.029	.004	.003			
3	44.64	12.82	3.64	8.34	10.05	10.09	3.39	1.76	1.20	0.36	1.99	0.90	0.16	CO ₂ trace SO ₂ none S none BaO 0.14 SrO 0.09	99.57	
A1. I	.744	.126	.023	.116	.251	.180	.055	.019			.023	.006	.002			
4	42.35	12.29	3.89	7.05	13.09	12.49	2.74	1.04	1.50	0.32	1.82	0.99	0.21	ZrO ₂ none SO ₂ 0.05 Cr ₂ O ₃ 0.10 V ₂ O ₅ 0.04 NiO 0.03 BaO 0.10 SrO 0.09 Li ₂ O trace	100.19	3.122
A1. I	.706	.120	.024	.096	.327	.223	.043	.011			.023	.007	.003			

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 5. PERSODIC. SCANOSE. (H. S. WASHINGTON, 1914.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III.(5)6.2."5. 2.3.2.2.	or 4.45 di 17.93 ab 28.30 ol 12.18 an 10.56 mt 2.32 ne 6.53 il 9.73 hm 1.76 ap 2.69	Scano Monte Ferru, Sardinia.	H. S. Washing- ton.	H. S. Washington, B. Soc. G. It., XXXIII, p. 153, 1914.	Analcite basalt.	Also in J. G., XXII, p. 748, 1914.
2	III.(5)6.2.(4)5. 2.3.2.2.	or 5.56 di 19.98 ab 30.65 ol 13.73 an 11.12 mt 8.35 ne 7.52 il 1.37	Palagonia, Val di Noto, Sicily.	G. Ponte.	G. Ponte, At. Ac. Gioen. (5), III, No. X, p. 7, 1910.	Basalt glass. (palagonite).	

SUBRANG 2. DOPOTASSIC. OTTAJANOSE. (A. LACROIX, 1907.)

1	"III.6.3.2". 1.2.2.2.	or 17.79 di 29.82 an 21.96 ol 8.67 lc 8.28 mt 1.39 ne 7.95 il 2.43 ap 1.01	Above Ottajano, Monte Somma, Italy.	Pisani.	A. Lacroix, C. R., CXLI, p. 1192, 1905.	Leucoteph- rite.	Also in N. Arch. Mus. (4), IX, p. 28, 1907.
2	III.6.(2)3.2. 2.2.2.2.	or 23.63 di 25.05 an 12.51 ol 11.82 lc 5.01 mt 5.10 ne 5.96 il 4.26 ap 4.37	Near Baleangin, Gentungen River, Pic de Maros, Celebes.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 627, 1913.	Marosite (shonkinite).	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915.

SUBRANG 3. SODIPOTASSIC. OUROSE. (C. I. P. W., 1902.)

1	III.6."3.3(4). 2.3.2.2.	or 16.68 di 20.50 ab 2.62 ol 10.12 an 15.57 mt 4.41 ne 11.36 il 4.41 ap 3.02	Bet. Lich and Butzbach, Giessen, Hesse.	Stadler.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 464, 1908.	Leucite basanite.	Fresh?
2	III.6.3.3(4). 2.2.2.3.	or 16.68 di 31.31 ab 3.14 ol 11.20 an 19.74 mt 3.48 ne 11.08 il 2.74	Tremola, St. Gotthard, Switzerland.	K. M. Jene.	P. Waindiziok, In. Diss. Zur., p. 39, 1906.	Vogesite- spessartite.	
3	III.6.3."3. 2.2.2.2.	or 21.41 di 32.36 an 20.29 ol 6.36 lc 2.83 mt 4.64 ne 9.09 il 2.13 ap 0.34	Lapilli of 1906, Ottajano, Mount Vesuvius.	Pisani.	A. Lacroix, C. R., CXLIH, p. 16, 1906.	Leucite tephrite.	Also in N. Arch. Mus. (4), IX, p. 28, 1907.
4	(II)III.6.(2)3.3". 3.2.2.3.	or 22.24 di 16.36 ab 7.70 ol 3.39 an 17.79 mt 10.21 ne 11.22 il 6.94 ap 2.02	Namlagira, Lake Kivu District, German East Africa.	Eyme.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 18, 1912.	Leucite basanite.	
5	III.6.(2)3.3". 2.2.2.3.	or 20.57 di 25.21 ab 0.52 ol 9.25 an 14.46 mt 8.35 ne 13.63 il 5.17 ap 2.02	Kisi, Lake Kivu District, German East Africa.	Eyme.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 18, 1912.	Leucite basanite.	

SUBRANG 4. DOSODIC. LIMBURGOSE. (C. I. P. W., 1902.)

1	III.(5)6.3"(3)4. 2.3.2.3.	or 13.34 di 14.33 ab 8.38 ol 15.50 an 26.13 mt 4.64 ne 7.38 il 7.90 ap 1.34	Buchanan, n. Peekskill, New York.	G. S. Rogers.	G. S. Rogers, Ann. N. Y. Ac. Sci., XXI, p. 61, 1911.	Diorite.	
2	III."6.3.4". 2.3.2.2.	or 6.12 di 26.13 ab 13.10 ol 20.05 an 17.24 mt 3.94 ne 6.82 il 4.41 ap 1.34	Pinto Mountain, Kinney County, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 61, 1900.	Basalt.	In W. T., p. 343.
3	III."6."3.4. 2.3.2.2".	or 10.56 di 23.30 ab 13.62 ol 17.01 an 14.46 mt 5.34 ne 8.24 il 3.80 ap 2.02	Rattlesnake Butte, Apishapa quad- rangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. P. P. 90, p. 27, 1914.	Basalt.	
4	III(IV).6.3.4. 2.3.2.2.	or 6.12 di 29.55 ab 3.93 ol 18.41 an 18.35 mt 5.57 ne 10.08 il 3.50 ap 2.35	Ciruella, Colfax County, New Mexico.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 171, 1900.	Nephelite basanite.	In W. T., p. 343.

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. LIMBURGASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5	44.82	13.68	2.76	7.57	10.11	12.76	2.83	0.89	2.81		1.35	0.15			99.73	3.016
A2. II	.747	.134	.017	.106	.253	.227	.045	.009			.017	.001				
6	45.03	14.82	2.77	8.81	7.79	9.83	4.33	1.51	1.71	0.24	2.30	0.58	0.37	CO ₂ 0.22 FeS ₂ 0.15 NiO 0.05 BaO none	100.51	
A1. I	.751	.145	.018	.122	.195	.175	.070	.016			.029	.004	.005			
7	44.69	14.17	3.35	10.86	6.41	10.28	3.64	2.01	2.53	1.05	0.46	0.45	0.31	CO ₂ none	100.21	
A2. II	.745	.138	.021	.151	.160	.184	.059	.021			.006	.003	.002			
8	40.2	12.8	4.0	10.4	11.9	10.4	2.7	0.8	3.4		2.9				99.5	
B3. IV	.670	.125	.025	.144	.298	.186	.044	.009			.036					
9	49.10	15.75	1.00	8.80	6.35	8.56	4.47	1.91	0.75		2.92	0.22			99.83	
A2. II	.818	.154	.006	.122	.159	.153	.073	.020			.037	.002				
10	46.31	14.90	1.77	8.98	8.15	9.51	4.06	1.62	1.38		3.00	0.32			100.00	
A2. II	.772	.146	.011	.125	.204	.170	.066	.017			.038	.002				
11	44.82	14.06	4.56	7.27	8.60	9.56	3.69	2.30	0.30	0.05	4.25	0.67	none	CO ₂ none	100.13	
A2. II	.747	.138	.029	.101	.215	.171	.060	.024			.053	.005	—			
12	44.80	15.51	2.35	8.52	8.83	9.91	2.99	2.29	0.16	0.09	4.01	0.68	0.08	CO ₂ none NiO 0.13	100.35	
A2. II	.747	.152	.015	.118	.221	.177	.048	.024			.050	.005	.001			
13	44.29	12.62	3.61	8.84	10.06	9.23	3.25	1.82	0.21	0.09	4.92	0.57		CO ₂ none ZrO ₂ 0.02 SO ₃ 0.05 BaO 0.06 SrO 0.04	99.68	
A1. I	.738	.124	.023	.123	.252	.164	.053	.020			.062	.004				
14	44.20	13.96	3.19	8.41	8.03	9.79	3.66	2.35	0.76	0.12	4.10	0.62	0.51	CO ₂ none NiO 0.14	99.84	
A2. II	.737	.137	.020	.117	.201	.175	.059	.025			.051	.004	.007			
15	43.65	11.48	6.32	8.00	7.92	14.00	2.28	1.51	1.00		4.00	trace			100.16	
A3. III	.728	.114	.039	.111	.198	.250	.037	.016			.050	—				
16	37.90	13.17	8.83	8.37	9.50	10.75	2.35	2.12	1.40		5.30	trace			99.69	
A3. III	.632	.129	.055	.116	.238	.192	.038	.022			.066	—				
17	43.50	14.74	6.53	5.32	3.19	14.93	3.49	2.11	3.69		2.55	0.61			100.66	2.932
A2. II	.725	.144	.041	.074	.080	.266	.056	.022			.032	.004				
18	43.92	15.87	8.45	5.59	5.20	12.86	4.08	1.41	2.03		0.71				100.12	3.071
A3. III	.732	.155	.053	.078	.130	.230	.066	.015			.009					
19	42.55	13.22	11.13	4.28	11.41	10.20	3.73	1.25	1.44		0.73				99.94	3.07
A3. III	.709	.130	.069	.060	.285	.182	.060	.014			.009					
20	42.24	11.93	12.43	5.30	9.45	11.97	3.35	1.05	1.28		1.08				100.08	3.091
A3. III	.704	.117	.078	.074	.236	.214	.054	.012			.014					

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBBRANG 4. DOSODIC. LIMBURGOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	III.6.3(4).4". 2.2.2.2.	or 5.00 di 31.23 ab 8.12 ol 14.36 an 23.35 mt 3.94 ne 8.38 il 2.58	Las Amolanas, Atacama, Chile.	M. Dittrich.	F. v. Wolff, Z. D. D. G., LI, p. 506, 1899.	Limburgite.	In W. T., p. 343.
6	III.6.3.4". 2.2.2.3.	or 8.90 di 23.21 ab 13.62 ol 13.64 an 16.40 mt 4.18 ne 12.50 il 4.41 ap 1.34	Craw, n. Lennoxtown, Glasgow, Scotland.	E. G. Radley.	G. S. G. B., Sum. Prog. (1907), p. 55, 1908.	Essexite.	
7	III.6.3.4. 2.2.2.3.	or 11.68 di 26.69 ab 8.91 ol 14.30 an 16.12 mt 4.87 ne 11.93 il 0.91 ap 1.01	Howford Bridge, Mauchline, Ayrshire, Scotland.	A. Scott.	G. W. Tyrrell, pers. com.	Essexite- dolerite.	
8	III(IV).6.3.4". 2.3.2.2.	or 5.00 di 25.39 ab 2.10 ol 21.60 an 20.02 mt 5.80 ne 11.36 il 5.47	Chesters quarry, East Lothian, Scotland.	F. H. Hatch.	F. H. Hatch, T. R. Soc. Edin., XXXVII, p. 116, 1892.	Limburgite.	Not in W. T.
9	(II)III.5(6).2(3). 4. 2.3.2.3.	or 11.12 di 19.26 ab 24.10 ol 12.34 an 16.96 mt 1.39 ne 7.67 il 5.62 ap 0.67	Font-des-Vaches, Cantal, France.	Pisani.	A. Lacroix, C. R., CXLIX, p. 546, 1909.	Essexitic gabbro.	
10	III.6.3.4. 2.3.2.3.	or 9.45 di 22.46 ab 15.98 ol 14.17 an 17.51 mt 2.55 ne 10.08 il 5.78 ap 0.67	Font-des-Vaches, Cantal, France.	Pisani.	A. Lacroix, C. R., CXLIX, p. 546, 1909.	Essexitic gabbro.	
11	III.6.2(3).4. 2.2.2.2.	or 13.34 di 21.86 ab 14.15 ol 9.73 an 15.01 mt 6.73 ne 9.37 il 8.06 ap 1.68	Monte Sacopa, Olot, Spain.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXIV, p. 239, 1907.	Nephelite basanite.	
12	III.5(6).3.4". 2.3.2.2.	or 13.34 di 17.79 ab 11.53 ol 15.07 an 22.24 mt 3.48 ne 7.38 il 7.60 ap 1.68	Fuente San Roque, Olot, Spain.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXIV, p. 239, 1907.	Limburgite.	
13	III.5(6).3.4. 2.3.2.2.	or 11.12 di 22.02 ab 15.20 ol 14.10 an 14.18 mt 5.34 ne 6.82 il 9.42 ap 1.34	Las Planas, n. Olot, Spain.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXIV, p. 239, 1909.	Nephelite basanite.	
14	III.6.2(3).4. 2.2.2.3.	or 13.90 di 24.28 ab 9.43 ol 11.11 an 14.73 mt 4.64 ne 11.64 il 7.75 ap 1.34	Cruz Cat, n. Olot, Spain.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXIV, p. 239, 1907.	Nephelite basanite.	
15	III(IV).6.3.4. 2.1.3.2.	or 8.90 di 41.33 ab 5.50 ol 2.27 an 16.96 mt 9.05 ne 7.52 il 7.60	Brandberget, Gran, Norway.	L. Schmelck.	W. C. Brögger, Q. J. G. S., L, p. 19, 1894.	Olivine gabbro diabase.	In W. T., p. 343.
16	III.6(7).3.(3)4. 3.2.2.2.	or 7.23 di 26.57 an 19.18 ol 8.05 lc 3.92 mt 11.50 ne 10.79 il 10.03 hm 0.80	Brandberget, Gran, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 93, 1899.	Hornblendite.	In W. T., p. 343.
17	III.6.3.4.⊙ 2.1.3.3.	or 12.23 di 17.53 ab 10.48 ol 11.11 an 18.35 mt 9.51 ne 10.22 il 4.86 ap 1.34	Limberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L.-A., IV, p. 134, 1901.	Augitite.	In W. T., p. 345.
18	III.6.3.4.⊙ 2.1.3.3.	or 8.34 di 32.04 ab 7.86 ol 1.16 an 20.57 mt 12.30 ne 14.48 il 1.37	Armansberg, n. Kemnath, Bavaria.	H. Waldeck.	H. Waldeck, In. Diss. Erl., p. 47, 1905.	Nephelite basanite.	
19	III.6.3.4. 2.2.2.2.	or 7.78 di 27.22 ab 7.86 ol 11.13 an 15.57 mt 11.83 ne 12.78 il 1.37 hm 2.88	Kleine Kulm, n. Kemnath, Bavaria.	H. Waldeck.	H. Waldeck, In. Diss. Erl., p. 37, 1905.	Nephelite basalt.	
20	III(IV).6.3.4". 2.2.2.2.	or 6.67 di 35.21 ab 7.86 ol 5.11 an 14.18 mt 13.92 ne 11.08 il 2.13 hm 2.88	Raube Kulm, n. Kemnath, Bavaria.	H. Waldeck.	H. Waldeck, In. Diss. Erl., p. 35, 1905.	Nephelite basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. LIMBURGASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
21	41.63	12.40	11.33	6.24	10.61	11.87	3.14	0.72	0.42		1.18	0.35			99.89	3.057
A2. II	.694	.121	.071	.087	.265	.213	.051	.008			.015	.002				
22	43.37	11.55	9.27	6.52	11.01	12.99	2.57	0.93	0.12		1.24				99.57	
A3. III	.723	.113	.058	.090	.275	.232	.042	.010			.016					
23	43.10	11.71	4.43	8.28	13.20	10.84	2.78	1.27	1.71		1.88	0.49		SO ₂ 0.09	99.78	3.088
A2. II	.718	.114	.027	.115	.330	.193	.045	.014			.023	.004				
24	41.52	13.99	8.32	5.28	7.74	13.61	3.98	1.63	1.47		0.81	2.01			100.36	3.046
A2. II	.692	.137	.052	.074	.194	.243	.065	.017			.010	.014				
25	43.22	12.77	7.09	4.71	9.12	10.82	3.04	2.16	3.38	0.58	2.74	0.32		CO ₂ 0.28 SO ₂ 0.33	100.56	
A2. II	.720	.125	.044	.065	.228	.193	.049	.023			.034	.002				
26	44.59	13.28	5.09	5.34	11.87	10.63	2.74	1.70	1.26	0.65	1.96				99.11	
B3. IV	.743	.130	.032	.074	.297	.189	.044	.018			.025					
27	43.26	11.84	3.97	7.65	11.78	11.36	2.85	1.95	2.97	0.25	2.43				100.31	
A3. III	.721	.116	.025	.107	.295	.203	.046	.021			.030					
28	45.32	13.23	3.71	5.82	15.24	9.05	3.34	2.13	1.43		1.15	0.25	0.08		100.75	
A2. II	.755	.130	.023	.081	.381	.162	.054	.022			.014	.002	.001			
29	44.50	15.97	5.22	6.99	7.31	9.60	3.62	2.85	3.10		0.76	0.63		SO ₂ 0.52	101.07	
B2. III	.742	.157	.033	.097	.183	.171	.058	.030			.010	.004				
30	43.10	15.18	5.30	8.58	7.50	11.87	3.97	2.51	0.72		0.52	1.52			100.77	3.205
A2. II	.718	.149	.033	.119	.188	.213	.065	.027			.007	.011				
31	44.66	16.04	4.37	8.12	7.70	9.90	4.28	1.75	2.15		0.29	0.10	0.15		99.51	
A2. II	.744	.157	.028	.113	.193	.177	.069	.019			.004	.001	.002			
32	42.35	16.24	5.33	6.28	8.97	12.46	2.37	2.01	2.87		0.41				99.29	
B3. IV	.706	.159	.033	.088	.224	.222	.039	.021			.005					
33	47.11	15.95	5.44	9.54	4.93	10.26	4.41	1.36	0.16		1.26	0.19	0.12		100.71	2.92
A2. II	.785	.156	.034	.132	.123	.183	.071	.015			.016	.001	.002			
34	46.86	16.03	5.34	9.31	5.10	9.89	4.52	1.41	0.16		1.17	0.22	0.12	NiO 0.10	100.23	2.91
A2. II	.781	.157	.033	.129	.128	.177	.073	.015			.015	.002	.002			
35	47.44	12.00	6.23	3.65	5.62	15.85	3.47	1.60	2.29		1.50		0.80		100.45	3.020
A2. II	.791	.118	.039	.051	.141	.283	.056	.017			.019		.011			
36	42.71	14.62	3.12	9.34	8.91	10.68	3.11	1.55	1.55		3.38	0.74		S 0.09	99.90	3.027
A2. II	.712	.143	.019	.130	.223	.191	.050	.017			.042	.005				

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 4. DOSODIC. LIMBURGASE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
21	III''6.3.4(5). 2.2.2.2.	or 4.45 di 31.13 ab 9.43 ol 8.54 an 17.51 mt 16.47 ne 9.37 il 2.28 ap 0.67	Auzenberg, n. Kemnath, Bavaria.	H. Waldeck.	H. Waldeck, In. Diss. Erl., p. 17, 1905.	Nephelite basalt.	
22	III(IV)6.3.4. 2.2.2.2.	or 5.56 di 37.26 ab 7.34 ol 8.59 an 16.96 mt 13.46 ne 7.95 il 2.43	Birstein, Vogelsberg, Hesse.	Hauser.	T. Tannhäuser, Bautech. Gest. Unters., I (1), p. 41, 1910.	Basalt.	
23	III(IV)6.3.4. 2.3.2.2.	or 7.78 di 27.64 ab 6.29 ol 20.34 an 15.29 mt 6.26 ne 9.37 il 3.50 ap 1.34	Ilmenberg, Rhöngebirge.	Klüss.	H. Proescholdt, Jb. Pr. G. L.-A., XIV, p. 12, 1894.	Basalt.	In W. T., p. 345.
24	III.6(7).(2)3.4. 2.2.3.2.	or 9.45 di 30.72 ab 4.72 ol 4.68 an 15.29 mt 12.06 ne 15.90 il 1.52 ap 4.70	Sumpf Kuppe, Roth, Rhöngebirge.	P. Schmidt.	P. Schmidt, Ref. N. J., 1905, II, p. 213.	Nephelite basalt.	
25	III.6.''3.''4. 2.2.2.2.	or 12.79 di 30.24 ab 7.07 ol 6.16 an 14.73 mt 7.19 ne 10.08 il 5.17 ap 0.67	Offenthal, Odenwald.	L. Walter.	G. Klemm, Nb. Ver. Erdk. (4), XXVIII, p. 37, 1907.	Monchiquite.	
26	III.(5)6.3.4. 2.2.2.2.	or 10.01 di 26.36 ab 9.43 ol 13.83 an 18.90 mt 7.42 ne 7.38 il 3.80	Hohe Warte, Giessen, Hesse.	Hess.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 458, 1908.	Basalt.	
27	III(IV).6''/3.''4. 2.2.2.2.	or 11.68 di 34.00 an 13.62 ol 14.44 ne 13.06 mt 5.80 il 4.56	Hohe Warte, Giessen, Hesse.	A. Streng.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 458, 1908.	Basalt.	
28	III.6.''3.4. 2.3.2.2.	or 12.23 di 22.17 ab 5.50 ol 23.84 an 15.01 mt 5.34 ne 12.35 il 2.13 ap 0.67	Oberlichtenau, Lausitz.	M. Voigt.	M. Voigt, In. Diss. Leip., p. 29, 1906.	Biotite diabase.	
29	''III.6.3.''4. 2.3.2.2.	or 16.68 di 18.32 ab 8.65 ol 11.97 an 21.13 mt 7.66 ne 9.80 il 1.52 th 0.99 ap 1.34	Wesseln, Polzen District, Bohemia.	K. H. Scheu- mann.	K. H. Scheumann, Abh. Sachs. Ges. W., XXXII, p. 758, 1913.	Biotite- haunyne basalt.	Fresh?
30	III.6(7).(2)3.4. 2.2.2.3.	or 15.01 di 26.82 an 15.85 ol 11.77 ne 18.46 mt 7.66 il 1.06 ap 3.70	Workotsch, Bohemia.	R. Pfohl.	J. E. Hibsich, T. M. P. M., XXIII, p. 338, 1904.	Basalt.	
31	III.6.3.4.⊙ 2.2.2.2.	or 10.56 di 23.70 ab 7.60 ol 13.60 an 19.18 mt 6.50 ne 15.48 il 0.61 ap 0.34	Eresztreny, Medves Moun- tains, Hungary.	K. Emszt.	Razlozsnik and Emszt, F. K., XLI, p. 354, 1911.	Nephelite basanite.	TiO ₂ low?
32	III.6.3(4).4. 2.2.2.2.	or 6.67 di 27.31 an 27.52 ol 11.43 lc 3.92 mt 7.66 ne 11.08 il 0.76	Monte Rizzoni, Monzoni, Tyrol.	C. Doelter.	C. Doelter, Anz. Ak. W. Wien, XL, p. 10, 1903.	Rizzonite (limburg- ite).	TiO ₂ low?
33	III.''6.3.4''. 2.2.2.3.	or 8.34 di 25.20 ab 18.56 ol 8.04 an 19.46 mt 7.89 ne 9.94 il 2.43 ap 0.34	Eruption of 1883. Mount Etna, Sicily.	O. Silvestri.	O. Silvestri, At. Ac. Gioen. (3), XVII, p. 378, 1883.	Basalt.	Not in W. T.
34	''III.''6.3.4''. 2.2.2.3.	or 8.34 di 23.10 ab 19.65 ol 9.08 an 19.18 mt 7.66 ne 10.08 il 2.28	Eruption of 1886, Mount Etna, Sicily.	B. Gentilecusa?	O. Silvestri, At. Ac. Gioen. (4), VI, Mem. XX, p. 4, 1893.	Basalt.	Not in W. T.
35	III.''6.(2)3.4. 2.1.3.2.	or 9.45 di 31.45 ab 13.62 wo 10.79 an 12.51 mt 9.05 ne 8.52 il 2.89	Magnitnaja Gora, S. Ural Moun- tains, Russia.	J. Morozewicz.	J. Morozewicz, Mem. C. G. Russ., XVIII, No. 1, p. 10, 1901.	Augite dio- rite.	Also in T. M. P. M., XXIII, p. 120, 1904.
36	III.6.3.4.⊙ 2.3.2.2.	or 9.45 di 21.91 ab 8.38 ol 15.05 an 21.13 mt 4.41 ne 9.66 il 6.38 ap 1.83	Bocca dos Corregos, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. LIMBURGASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
37	42.37	13.29	3.79	10.24	10.76	11.17	2.94	1.17	0.56		3.21	0.57		S 0.09	100.16	3.098
A2. II	.706	.130	.024	.142	.249	.200	.047	.013			.040	.004				
38	41.72	11.47	4.04	10.58	12.55	10.82	2.28	1.22	1.11		3.41	0.66		S 0.04	99.90	3.079
A2. II	.694	.112	.025	.147	.314	.193	.037	.013			.043	.005				
39	42.77	15.80	3.34	10.85	9.04	9.77	3.49	1.65	0.27	0.35	3.08		0.18		100.59	
A2. II	.713	.155	.021	.151	.226	.175	.056	.018			.039		.003			
40	41.49	16.27	3.08	8.57	8.97	11.70	3.26	1.24	0.31	0.15	3.50		0.45		99.48	
A2. II	.692	.159	.019	.119	.224	.209	.053	.013			.044		.006			
41	43.04	14.76	4.91	8.52	8.27	13.03	2.70	1.44	0.80		2.50	0.35			100.32	
A2. II	.717	.145	.031	.118	.207	.232	.044	.015			.031	.002				
42	44.96	18.06	4.04	7.82	5.58	8.99	4.56	2.54	0.60	0.13	1.94	0.62	0.26		100.10	
A2. II	.749	.177	.025	.108	.140	.161	.074	.027			.024	.004	.004			
43	43.72	17.32	7.21	6.03	6.01	12.00	3.40	1.57	1.80		0.81	0.32			100.19	
A2. II	.729	.170	.045	.083	.150	.214	.055	.017			.010	.002				
44	46.79	16.47	3.13	6.05	6.60	12.50	3.78	1.14	0.89	0.30	2.12	0.27			100.04	
A2. II	.780	.161	.019	.084	.165	.223	.061	.012			.027	.002				
45	43.16	18.61	2.93	6.73	5.34	11.46	3.98	2.20	1.44	0.05	2.71	1.21			99.82	
A2. II	.719	.182	.018	.093	.134	.205	.065	.023			.034	.008				
46	44.80	17.30	4.90	6.85	5.72	11.70	4.03	2.08	0.35		2.60	0.50			100.83	
A2. II	.747	.170	.031	.095	.143	.209	.065	.022			.033	.004				
47	43.40	15.29	6.65	7.11	4.95	11.23	3.74	2.78	0.09		3.90	1.14			100.28	
A2. II	.723	.150	.042	.099	.124	.200	.060	.023			.049	.008			(99.78)	
48	41.12	11.65	7.29	7.16	7.78	12.07	2.56	2.14	0.70	0.38	6.38	0.92			100.15	
A2. II	.685	.114	.046	.100	.195	.216	.041	.022			.080	.006			(100.18)	
49	42.49	14.23	3.51	8.20	7.69	12.42	2.63	1.21	3.40	0.40	3.31	0.44			99.93	
A2. II	.708	.140	.022	.114	.192	.221	.042	.013			.041	.003				
50	40.10	15.50	6.35	7.29	8.41	12.40	3.37	1.67	0.87		2.98	1.28			100.22	
A2. II	.668	.152	.040	.101	.210	.221	.055	.018			.037	.009				
51	44.66	13.37	2.10	8.01	13.84	8.88	3.15	2.16	1.75	0.23	1.60	0.57		CO ₂ 0.09	100.41	2.939
A2. II	.744	.131	.013	.111	.346	.159	.051	.023			.020	.004				

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 4. DOSODIC. LIMBURGOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
37	III.6.3.4.⊙ 2.3.2.2.	or 7.23 di 26.17 ab 7.34 ol 16.30 an 19.46 mt 5.57 ne 9.37 il 6.08 ap 1.34	Canical, Madeira.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Limburgite.	
38	III(IV).''6.3.4. 2.3.2.2.	or 7.23 di 25.36 ab 6.55 ol 21.32 an 17.24 mt 5.80 ne 6.96 il 6.54 ap 1.68	Pico Serrado, Madeira.	Eyme.	C. Gagel, Z. D. G. G., LXIV, p. 429, 1912.	Trachy- dolerite.	
39	III.6.3.4.⊙ 2.3.2.3.	or 10.01 di 21.20 ab 3.93 ol 17.93 an 22.52 mt 4.87 ne 13.27 il 5.93	Cumbre lava, Esperanza, Tenerife, Canary Islands.	N. Sahlbom.	H. Preiswerk, N. J. Ch., 1909, p. 396.	Basalt.	Also in Vh. Nf. Ges. Basel, XXI, p. 221, 1910.
40	III.6.3''4. 2.2.2.2.	or 7.23 di 25.86 ab 0.52 ol 13.14 an 25.85 mt 4.41 ne 14.77 il 6.69	Anaga Mountains, above Mercedes, Tenerife, Canary Islands.	N. Sahlbom.	H. Preiswerk, N. J. Ch., 1909, p. 396.	Basalt.	Also in Vh. Nf. Ges. Basel, XXI, p. 221, 1910.
41	III.6.3''4. 2.2.2.2.	or 8.34 di 30.98 ab 3.67 ol 9.51 an 23.91 mt 7.19 ne 10.51 il 4.71 ap 0.67	Topsail Point, Tamara Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, N. Arch. Mus., III, p. 83, 1911.	Monchiquite.	
42	(II)III.6.''3.4. 2.3.2.3.	or 15.01 di 16.25 ab 9.96 ol 10.48 an 21.13 mt 5.80 ne 15.62 il 3.65 ap 1.34	Mont Caffé, Sao Thomé Island, Guinea Coast.	A. Lindner.	W. Boese, N. J. B. B., XXXIV, p. 264, 1912.	Trachy- dolerite.	3 places.
43	''III.6.3''4. 2.2.2.2.	or 9.45 di 24.08 ab 8.91 ol 5.18 an 27.24 mt 10.44 ne 10.79 il 1.52 ap 0.67	Ladder Hill, St. Helena Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 645, 1912.	Trachy- dolerite.	
44	III.''6.3.4''. 2.2.2.2.	or 6.67 di 28.42 ab 15.20 ol 5.70 an 24.46 mt 4.41 ne 9.09 il 4.10 ap 0.67	Nosy Komba, Madagascar.	Not stated.	A. Lacroix, pers. com.	Gabbro dissolved in nephelite syenite.	Cf. No. 18, I.6.2.4 and No. 123, II.5.4.4.
45	(II)III.6.3.4. 2.2.2.3.	or 12.79 di 18.78 ab 6.31 ol 7.04 an 26.13 mt 4.18 ne 14.48 il 5.17 ap 2.69	Nosy Komba, Madagascar.	Not stated.	A. Lacroix, pers. com.	Gabbro dissolved in nephelite syenite.	Cf. No. 18, I.6.2.4 and No. 123, II.5.4.4.
46	''III.6.3.4. 2.2.2.3.	or 12.23 di 25.11 ab 8.38 ol 4.50 an 23.07 mt 7.19 ne 13.92 il 5.02 ap 1.34	Berondra, Bezavona Mountains, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 194, 1903.	Essexite.	Inclosed in No. 18, II.6.3.4.
47	III.''6.3.4. 3.1.2.3.	or 12.79 di 23.09 ab 13.88 ol 1.88 an 18.63 mt 9.74 ne 9.51 il 7.45 ap 2.69	Antsahondra, Itasy, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 179, 1913.	Labradorite (basalt).	
48	IIY''6.3.''4. 3.1.2.2.	or 12.23 di 31.32 ab 7.07 ol 3.50 an 14.18 mt 4.64 ne 7.31 il 12.16 ap 2.02	Andranonatoa, Itasy, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 179, 1913.	Limburgite.	
49	III.''6.3(4).4. 2.2.2.2.	or 7.23 di 28.05 ab 8.38 ol 8.99 an 23.63 mt 5.10 ne 7.38 il 6.23 ap 1.01	Sambirano, Madagascar.	Boiteau.	A. Lacroix, pers. com.	Basalt.	
50	III.6''3.4. 2.2.2.2.	or 10.01 di 24.57 ab 1.05 ol 8.92 an 21.96 mt 9.28 ne 15.05 il 5.62 ap 2.96	Ambaliha, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 138, 1902.	Ijolite.	
51	III.6.''3.4. 2.3.2.2.	or 12.79 di 19.73 ab 5.76 ol 25.43 an 15.81 mt 3.02 ne 11.36 il 3.04 ap 1.34	Bald Hills, Hill End, New South Wales.	H. P. White.	A. R. Dep. Min., N. S. W. (1911), p. 198, 1912.	Olivine basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. LIMBURGASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
52	44.54	16.44	2.00	9.75	10.82	9.16	3.04	1.23	1.53	0.25	0.80	0.44	0.05	CO ₂ 0.11 SO ₃ 0.07 Cl none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.06 NiO 0.04 BaO 0.02 SrO trace Li ₂ O trace CuO trace	100.37	3.000
A1. I	.742	.161	.013	.136	.271	.164	.049	.013			.010	.003	—			
53	43.54	15.61	3.20	8.64	9.16	8.88	3.44	2.10	2.56	0.32	1.81	0.40	0.26	CO ₂ 0.21 ZrO ₂ none SO ₃ 0.10 Cl trace S none Cr ₂ O ₃ trace V ₂ O ₅ 0.01 NiO 0.04 BaO 0.24 SrO trace CuO 0.01	100.53	2.953
A1. I	.726	.153	.020	.120	.229	.158	.055	.022			.023	.003	.004			
54	43.48	16.53	3.42	8.91	7.12	8.88	3.27	2.31	2.69	0.31	2.35	0.44	0.15	CO ₂ 0.40 SO ₃ 0.21 Cl 0.03 Cr ₂ O ₃ trace V ₂ O ₅ 0.01 NiO trace BaO 0.02 SrO trace CuO trace	100.28	2.943
A1. I	.725	.162	.021	.124	.178	.159	.053	.024			.029	.003	.002			
55	43.39	16.67	3.47	8.80	7.30	8.79	3.30	2.17	2.67	0.29	2.20	0.41	0.19	CO ₂ 0.39 SO ₃ 0.19 Cl 0.02 Cr ₂ O ₃ trace V ₂ O ₅ 0.01 NiO trace BaO 0.02 SrO trace	100.28	2.943
A1. I	.723	.163	.022	.122	.183	.157	.053	.023			.028	.003	.003			
56	42.52	16.82	2.90	7.56	6.43	9.78	4.02	1.31	5.51	0.47	1.30	1.46	0.15	CO ₂ 0.07 ZrO ₂ none SO ₃ none Cl trace Cr ₂ O ₃ none V ₂ O ₅ 0.03 NiO none BaO 0.04 SrO trace	100.37	2.812
A1. I	.709	.165	.018	.105	.161	.175	.065	.014			.016	.010	.002			
57	42.10	15.68	3.40	7.11	8.26	9.91	4.20	1.47	4.69	0.66	1.45	1.12	0.14	CO ₂ 0.08 ZrO ₂ none SO ₃ 0.08 Cl trace S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.03 NiO trace BaO 0.07 SrO trace Cu 0.01	100.42	2.799
A1. I	.702	.154	.021	.099	.207	.008	.068	.016			.018	.008	.002			
58	46.93	14.37	1.37	9.52	9.74	10.04	3.49	1.53	0.52	0.10	2.04	0.46		CO ₂ none	100.13	
A2. II	.783	.141	.009	.132	.244	.179	.056	.016			.026	.003				
59	44.25	16.27	1.50	10.30	6.51	10.14	3.24	1.98	2.40		3.65	0.63			100.87	
A2. II	.738	.160	.009	.143	.163	.181	.052	.021			.046	.004				
60	43.76	11.58	4.39	7.57	12.97	9.64	3.03	1.84	0.47		3.41	0.45		SO ₃ 0.14 S 0.15	99.78	3.032
A2. II	.729	.114	.028	.106	.324	.172	.048	.020			.043	.003				
61	43.01	12.23	3.57	12.07	13.62	10.17	2.26	0.95	0.16		1.51	0.40			99.95	
A2. II	.717	.120	.023	.168	.341	.182	.036	.010			.019	.003				
62	43.92	17.42	4.09	8.83	4.89	9.53	4.60	2.17	0.11	0.06	4.19	0.67	0.09		100.57	
A2. II	.732	.171	.026	.122	.122	.170	.074	.023			.052	.005	.001			
63	42.14	14.95	2.90	9.71	9.47	10.32	3.27	1.80	0.16	0.12	4.90	0.40	0.12		100.26	
A2. II	.702	.147	.018	.135	.237	.184	.053	.019			.061	.003	.002			

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 4. DOSODIC. LIMBURGOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
52	III.6.3.4.4. 1.2.2.2.	or 7.23 di 14.65 ab 10.22 ol 23.34 an 27.52 mt 3.02 ne 8.38 il 1.52 ap 1.01	Rookwood, Sydney, New South Wales.	J. C. H. Min- gaye.	Mingaye and White, Rec. G. S. N. S. W., VII (3), p. 230, 1903.	Olivine basalt.	
53	III.6.3.4.⊙ 2.3.2.2.	or 12.23 di 16.16 ab 8.91 ol 18.54 an 21.13 mt 4.64 ne 10.79 il 3.50 ap 1.01	Luddenham, Sydney, New South Wales.	H. P. White.	Mingaye and White, Rec. G. S. N. S. W., VII (3), p. 230, 1903.	Analcite basalt.	
54	III.6.3.4. 2.3.2.2.	or 13.34 di 14.59 ab 11.00 ol 14.76 an 23.63 mt 4.87 ne 9.09 il 4.41 ap 1.01	Bondi, Sydney, New South Wales.	J. C. H. Min- gaye.	G. W. Card, Rec. G. S. N. S. W., VII (2), p. 97, 1902.	Analcite basalt	Fresh?
55	III.6.3.4. 2.3.2.2.	or 12.79 di 13.50 ab 11.27 ol 15.72 an 24.19 mt 5.10 ne 8.94 il 4.26 ap 1.01	Bondi, Sydney, New South Wales.	J. C. H. Min- gaye.	G. W. Card, Rec. G. S. N. S. W., VII (2), p. 97, 1902.	Analcite basalt.	Fresh?
56	(II)III.6.3.4. 2.3.2.2.	or 7.78 di 12.64 ab 18.60 ol 14.25 an 23.91 mt 4.18 ne 8.38 il 2.43 ap 3.36	Rixons Pass, South Bulli, New South Wales.	H. P. White.	G. W. Card, pers. com.	Monchiquite.	
57	III.6.3.4.⊙ 2.3.2.2.	or 8.90 di 17.86 ab 9.96 ol 14.64 an 19.46 mt 4.87 ne 13.92 il 2.74 ap 2.69	South Bulli, New South Wales.	W. G. Stone.	N. S. W. Dep. Min., A. R. (1912), p. 198, 1913.	Monchiquite.	
58	III.6.3.4. 2.3.2.2.	or 8.90 di 22.50 ab 15.20 ol 19.08 an 19.18 mt 2.09 ne 7.67 il 3.95 ap 1.01	Blue Lake, Mount Gambier, South Australia.	E. R. Stanley.	E. R. Stanley, Tr. R. Soc. S. Aust., XXXIII, p. 87, 1909.	Olivine basalt.	
59	III.6.3.4. 2.3.2.2.	or 11.68 di 18.40 ab 11.53 ol 13.82 an 24.19 mt 2.09 ne 8.52 il 6.99 ap 1.34	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 117, 1910.	Basalt.	
60	III.6.3.4. 2.3.2.2.	or 11.12 di 25.41 ab 8.91 ol 17.78 an 12.79 mt 6.50 ne 18.80 il 6.54 ap 1.01	Matavuna Volcano, Savaii, Samoa.	Heuseler.	A. Klautzsch, Jb. Pr. G. L.-A., XXVII (1907), p. 174, 1910.	Basalt.	
61	III.6.3.4. 2.3.2.2.	or 5.56 di 22.00 ab 7.34 ol 29.03 an 20.57 mt 5.34 ne 6.25 il 2.89 ap 1.01	North Crater, Heard Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (3), p. 258, 1908.	Basalt.	
62	(II)III.6.3.4. 3.3.2.2.	or 12.79 di 17.73 ab 11.26 ol 6.93 an 20.57 mt 6.03 ne 14.91 il 7.90 ap 1.68	Sulphur Cones, Ross Island, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 103, 1907.	Hornblende basalt.	
63	III.6.3.4.⊙ 2.3.2.2.	or 10.56 di 21.99 ab 4.72 ol 14.97 an 20.85 mt 4.18 ne 12.50 il 9.27 ap 1.01	Winter Quarters, Ross Island, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 105, 1907.	Olivine basalt.	

CLASS III. SALFEMANE—Continued.

SUBRANG 3. ALKALICALCIC. LIMBURGASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
64	42.10	14.87	3.26	9.76	8.88	10.63	3.20	1.80	0.12	0.11	4.93	0.58	0.07		100.31	
A2. II	.702	.146	.020	.136	.222	.189	.052	.019			.062	.004	.001			
65	43.3	15.4	1.7	10.3	9.6	9.3	3.7	1.4	3.9		1.9				100.5	
B3. IV	.722	.151	.011	.143	.240	.166	.060	.015			.024					

RANG 3. ALKALICALCIC. LIMBURGASE.

1	45.17	17.18	1.92	7.88	9.95	8.93	4.23	0.27	2.18	0.27	1.63	none	0.15	CO ₂ 0.21 ZrO ₂ none S 0.11 BaO none	100.08	
A2. II	.753	.168	.012	.110	.249	.159	.068	.003			.020	—	.002			
2	44.16	15.94	2.61	9.75	4.62	8.96	5.13	0.72	2.88		3.14	1.50		SO ₃ 0.24	99.65	
A2. II	.736	.156	.016	.136	.116	.160	.082	.008			.039	.011				
3	45.99	13.42	4.63	6.48	12.29	9.01	4.32	0.61	1.05		1.71	0.40	0.55		100.46	
A2. II	.767	.132	.029	.090	.307	.161	.069	.007			.023	.003	.008			
4	43.52	15.39	4.82	10.83	5.94	9.83	4.04	0.52	1.43		3.92	0.10	0.14		100.48	
A2. II	.725	.151	.030	.150	.149	.175	.065	.006			.049	.001	.002			
5	46.84	13.14	5.75	0.73	10.96	14.38	3.56	0.45	3.38	0.23	0.47				99.89	3.02
A3. III	.781	.129	.036	.010	.269	.257	.057	.005			.006					
6	43.60	13.60	3.95	6.95	10.20	12.10	3.74	0.69	2.75		2.44	0.43			100.45	
A2. II	.727	.133	.025	.097	.255	.216	.060	.007			.031	.003				

RANG 4. DOCALCIC.

1	38.02	14.64	5.69	10.33	10.26	9.11	1.90	1.66	2.35	0.74	4.84	0.09	0.12	CO ₂ none	99.75	
A2. II	.634	.144	.036	.143	.257	.163	.031	.018			.060	.001	.002			
2	44.16	14.89	1.19	6.83	14.40	13.01	1.92	0.97	0.89	0.05	0.89		trace		99.30	
B3. IV	.736	.146	.008	.094	.360	.232	.031	.010			.011		—			
3	45.47	19.32	0.50	4.22	10.09	16.70	2.32	0.64	n. d.		0.18	0.35		S 0.21	100.00	
A2. II	.758	.189	.003	.058	.252	.298	.037	.007			.002	.002				
4	43.92	17.62	4.05	3.94	8.16	13.07	2.84	1.33	2.82		1.78	0.15		SO ₃ 0.47 Cl 0.22	100.37	
A2. II	.732	.173	.025	.055	.204	.234	.046	.014			.022	.001				
5	39.81	18.20	6.87	4.15	8.35	13.83	3.43	0.77	1.76		0.75	1.44	0.22	CO ₂ trace SO ₃ 0.24 Cl 0.18	100.00	
A2. II	.664	.178	.043	.058	.209	.246	.055	.008			.009	.010	.003			
6	36.38	16.08	12.86	6.93	5.01	15.53	2.44	1.15	0.82		2.08	1.12			100.40	
A2. II	.606	.158	.080	.096	.125	.277	.040	.013			.026	.008				

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 4. DOSODIC. LIMBURGASE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
64	III.6.3.4.⊙ 2.2.2.2.	or 10.56 di 22.46 ab 5.76 ol 13.44 an 20.85 mt 4.64 ne 11.64 il 9.42 ap 1.34	Winter Quarters, Ross Island, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 105, 1907.	Limburgite.	
65	III.6.3.4.⊙ 2.2.2.2.	or 8.34 di 20.52 ab 6.81 ol 20.43 an 21.13 mt 2.55 ne 13.35 il 3.65	Doumer Island, Graham Land, Antarctica.	Pisani.	E. Gourdon, Exp. Ant. Charc., Pet. vol., p. 192, 1908.	Hornblende basalt.	

SUBRANG 5. PERSODIC. BEKINKINOSE. (H. S. WASHINGTON, 1917.)

1	III.(5)6.3.5. 2.3.2.2.	or 1.67 di 13.87 ab 19.39 ol 20.77 an 26.97 mt 2.78 ne 8.80 il 3.04	Preston, Connecticut.	W. A. Drushel.	G. F. Loughlin, U. S. G. S. B. 492, p. 114, 1912.	Gabbro.	
2	(II)III.(5)6."3."5. 2.3.2.3.	or 4.45 di 13.05 ab 27.25 ol 11.66 an 18.35 mt 3.71 ne 8.52 il 5.93 ap 3.70	Neuwark, Harz.	Not stated.	O. H. Erdmannsdorfer, N. J. Cb., 1909, p. 40.	Diabase.	Dark facies. Cf. No. 10. II.6.3.4.
3	III."6."3.(4)5. 2.3.2.2.	or 3.89 di 20.90 ab 20.44 ol 19.15 an 15.57 mt 6.73 ne 8.52 il 3.50 ap 1.01	Nieder Putzkau, Lausitz.	M. Voigt.	M. Voigt, In. Diss. Leip., p. 25, 1906.	Olivine diabase.	
4	III.(5)6.3."5. 3.2.2.3.	or 3.34 di 20.83 ab 19.65 ol 10.48 an 22.24 mt 6.96 ne 7.81 il 7.45 ap 0.34	Taubenberg, Lausitz.	M. Voigt.	M. Voigt, In. Diss. Leip., p. 39, 1906.	Camptonite.	
5	III.6.3."5. 2.1.2.1.	or 2.78 di 41.04 ab 11.00 ol 5.53 an 18.63 mt 0.93 ne 10.22 il 0.91 hm 5.12	Bürkelkopf, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. K. Schw., XXIII, p. 226, 1909.	Diallage gabbro.	
6	III.6.3."5. 2.2.2.2.	or 3.89 di 30.88 ab 9.96 ol 11.59 an 18.35 mt 5.80 ne 11.64 il 4.71 ap 1.01	Bekinkina, Ambavatovy, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 229, 1903.	Ijolite.	Bekinkinite of Rosen- busch.

SUBRANG 4-5. PRESODIC. PAPENOOSE. (LACROIX, 1910.)

1	III.(5)6."4.(3)4. 2.3.2.2.	or 10.01 di 14.36 ab 3.14 ol 18.12 an 26.41 mt 8.35 ne 7.10 il 9.12 ap 0.34	Prospect Hill, Litchfield, Connecticut.	G. Steiger.	W. H. Hobbs, Rosenb. Fests., p. 41, 1906.	Hornblendite.	
2	III.6.4.4.⊙ 1.3.2.2.	or 5.56 di 28.13 ab 0.52 ol 23.46 an 29.19 mt 1.86 ne 8.52 il 1.67	Little Falls, Minnesota.	L. Nye.	F. F. Grout, J. G., XVIII, p. 656, 1910.	Gabbro.	
3	III.6.4.4." 1.2.2.2.	or 2.22 di 32.33 an 40.31 ol 12.03 lc 1.31 mt 0.70 ne 10.51 il 0.30 ap 0.67	Skeie, n. Bergen, Norway.	Lillejord.	C. F. Kolderup, Berg. Mus. Aarb., 1903, No. 12, p. 99.	Olivine gabbro.	
4	III.(5)6."4.4. 2.2.2.2.	or 7.78 di 24.32 ab 7.34 ol 7.02 an 33.92 mt 5.80 ne 6.53 il 3.34 hl 0.35 th 0.85	Rhöndorferthal, Siebengebirge, Rheinland.	K. Busz.	K. Busz., N. J., 1904, II, p. 91.	Heptorite (hauyne monchi- quite).	
5	III.6.(3)4.4(5). 2.2.2.2.	or 4.45 di 21.30 ab 1.31 ol 8.56 an 31.97 mt 9.98 ne 14.91 il 1.37 ap 3.36	Rosberg, n. Darmstadt, Hesse	Sonne.	C. Chelius, Nb. Ver. Erdk. (IV), XVII, p. 6, 1896.	Basalt.	Not in W. T.
6	III.6(7)."4.4 3.1.3.3.	an 29.19 di 27.00 lc 5.67 wo 0.93 ne 11.36 cs 1.03 mt 16.24 il 3.85 hm 1.60 ap 2.69	Wertberg, n. Homberg, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 29.	Nephelite basalt.	

CLASS III. SALFEMANE—Continued.

RANG 4. DOCALCIC—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	41.36	15.64	0.38	8.40	12.52	13.68	2.18	1.30	1.28		2.73	0.21	0.31	CO ₂ 0.16 SO ₃ none Cl 0.01 F none	100.16	3.099
A2. II	.689	.153	.002	.117	.313	.245	.035	.014			.034	.002	.004			
8	37.80	12.90	7.09	14.02	7.12	15.02	1.85	0.95	2.46		1.27				100.48	
A3. III	.630	.126	.044	.194	.178	.268	.090	.010			.016					
9	33.00	14.56	9.20	12.39	9.86	15.70	1.39	0.96	1.52		1.25				99.83	
A3. III	.550	.143	.058	.172	.247	.280	.023	.010			.016					
10	43.35	15.52	2.15	8.75	8.78	12.30	2.82	1.04	3.25		2.81	0.32			101.10	
A2. II	.723	.152	.014	.122	.220	.220	.045	.011				.002			(100.80)	
11	38.62	13.90	5.97	8.65	11.21	15.54	2.01	0.57	1.46		1.86	0.60	0.30		100.69	
A2. II	.644	.136	.037	.121	.280	.277	.032	.007			.023	.004	.004			
12	44.98	14.77	3.70	7.69	5.35	15.40	2.51	1.02	1.13		2.19	0.51	0.39	ZrO ₂ 0.05 SrO trace	99.69	
A2. II	.750	.145	.023	.107	.134	.275	.040	.011			.027	.004	.006			

CLASS III. SALFEMANE.

RANG 1. PERALKALIC. MALIGNASE. (C. I. P. W., 1902.)

1	47.85	13.24	2.74	2.65	5.68	14.36	3.72	5.25	2.74			2.42			100.65	2.879
A3. III	.798	.130	.017	.037	.142	.256	.060	.056				.017				

RANG 1. PERALKALIC. MALIGNASE.

1	51.38	15.88	1.48	4.37	4.43	8.62	7.57	4.20	0.42		0.12	0.98			99.45	
A2. II	.856	.156	.009	.061	.111	.154	.123	.045			.002	.007				
2	44.65	13.87	6.06	2.94	5.15	9.57	5.67	4.49	2.10	0.96	0.95	1.50	0.17	CO ₂ 0.11 SO ₃ 0.61 Cl trace BaO 0.76 SrO 0.37	99.92	
A1. I	.744	.136	.038	.041	.129	.171	.092	.048			.012	.011	.002			
3	42.02	12.05	7.93	5.06	2.18	17.01	4.85	3.15	0.67		2.36	1.66	0.96	S 0.54	100.54	
A2. II	.700	.118	.050	.071	.055	.304	.080	.034			.030	.012	.014			
4	42.12	12.24	5.71	7.83	0.15	8.43	11.97	2.59	0.76	0.80	2.56	4.95			100.11	
A2. II	.702	.120	.036	.108	.004	.150	.194	.028			.032	.035				
5	40.92	11.85	5.72	8.89	0.25	8.12	12.23	2.18	0.95	0.98	2.18	5.43			99.70	
A2. II	.682	.116	.036	.124	.006	.145	.197	.023			.027	.038				

ORDER 6. LENDOFELIC. PORTUGARE—Continued.

SUBRANG 4-5. PRESODIC. PAPENOOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	III.6(7)''4.4. 1.3.2.2.	an 28.91 di 19.83 lc 6.10 ol 23.81 ne 9.94 cs 3.96 mt 0.46 il 5.17 ap 0.67	Grünwald, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XXIX, p. 410, 1910.	Basalt.	
8	III(IV).6''''4.4. 2.3.2.3.	an 23.91 di 25.52 lc 4.36 ol 18.75 ne 8.52 cs 6.19 mt 10.21 il 2.43	Tswetli Bor, Iss River, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. Min. Fr., XXXIII, p. 366, 1910.	Issite (horn- blendite).	Also in C. R., CLI, p. 1137, 1910.
9	III''6.4.4. 2.5.2.3.	an 30.58 ol 27.29 lc 3.49 cs 14.62 ne 6.33 mt 13.46 kp 0.33 il 2.43	Tswetli Bor, Iss River, Ural Mountains.	Not stated.	Duparc and Pamfil, C. R., CLI, p. 1137, 1910.	Issite (horn- blendite).	
10	III''6.(3)4.4. 2.2.2.2.	or 6.12 di 26.20 ab 6.81 ol 13.13 an 26.69 mt 3.25 ne 9.09 il 5.32 ap 0.67	Diokhone, Cap Verde, Senegal.	Pisani.	J. Chantard, B. Soc. G. Fr. (4), VII, p. 437, 1907.	Limburgitic basalt.	
11	III(IV).6.4.4''. 2.3.2.2.	an 26.97 di 22.64 lc 3.05 ol 18.48 ne 9.09 cs 5.50 mt 8.58 il 3.50 ap 1.34	Dakar Peak, Cap Verde, Senegal.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 288, 1896.	Limburgite.	In W. T., p. 347.
12	III.(5)6.(3)4.4. 2.1.3.3.	or 6.12 di 38.02 ab 8.38 ol 2.32 an 26.13 mt 5.34 ne 6.82 il 4.10 ap 1.34	Adolf Friedrich Cone, Lake Kivu District, German East Africa.	O. Hauser.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 22, 1912.	Limburgite.	

ORDER 7. LENFELIC. KAMERUNARE. (C. I. P. W., 1902.)

SUBRANG 3. SODIPOTASSIC.

1	III.7.1(2).3. 2.1.3.2.	or 21.96 di 35.63 an 3.89 wo 2.67 lc 7.20 mt 3.94 ne 17.04 ap 5.71	Pooh-bah Lake, Rainy River District, Ontario.	F. L. Ransome.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 350, 1896.	Nephelite- pyroxene malignite.	In W. T., p. 347.
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SUBRANG 4. DOSODIC. MALIGNOSE. (C. I. P. W., 1902.)

1	(II)III.7.1.4. 1.1.3.2.	or 25.02 ac 4.16 ab 5.76 ns 0.37 ne 25.40 di 29.74 ol 3.18 il 0.30 ap 2.35	Pooh-bah Lake, Rainy River District, Ontario.	J. W. Sharwood.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 359, 1896.	Amphibole malignite.	In W. T., p. 347.
2	III.7.1.(3)4. 2.1.3.2.	or 26.89 di 27.86 ab 1.57 wo 1.16 ne 23.00 mt 7.19 th 1.14 il 1.82 hm 1.12 ap 3.70	Gordons Butte, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 150, p. 201, 1898.	Theralite.	In W. T., p. 347.
3	III''7.1.4. 2.1.4.0.	or 18.90 di 13.17 ab 1.05 wo 23.20 an 1.11 mt 11.60 ne 22.15 il 4.56 ap 4.03	As, Alnå, Sweden.	N. Sahlbom.	N. Sahlbom, N. J., 1897, II, p. 99.	Ijolite porphyry.	In W. T., p. 347.
4	III.7.1.4.⊙ 2.1.3.5.3.	or 15.57 ac 16.63 ab 6.55 ns 8.05 ne 22.58 di 8.12 ol 4.73 il 4.86 ap 11.76	Ankidona, Itasy, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 179, 1913.	Limburgitic basalt.	
5	III.7.1.4.⊙ 2.2.3.5.3.	or 12.79 ac 16.63 ab 8.91 ns 8.30 ne 21.58 di 4.43 ol 8.51 il 4.10 ap 12.77	Mazy, Itasy, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 179, 1913.	Limburgitic basalt.	

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

CLASS III. SALFEMANE—Continued.

RANG 1. PERALKALIC. MALIGNASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	47.18	15.21	4.07	7.26	6.64	8.86	7.61	1.41	0.72		1.09	0.08	0.02		100.15	2.868
B2. III	.786	.149	.026	.101	.166	.158	.123	.015			.014	—	—			

RANG 2. DOMALKALIC. KAMERUNASE. (C. I. P. W., 1902.)

1	47.30	16.81	2.19	6.91	5.16	10.43	2.33	6.86	0.20	0.16	1.13	0.70	0.09	ZrO ₃ none SO ₃ 0.15 Cl 0.06 BaO 0.23	100.74	
A1. I	.788	.165	.014	.096	.129	.186	.037	.073			.014	.005	.001			
2	47.39	14.79	3.10	5.08	6.77	11.61	1.49	6.93	0.77	0.28	1.41	0.45		CO ₂ none ZrO 0.04 SO ₃ none S none Ce ₂ O ₃ 0.05 BaO 0.15 SrO 0.04	100.35	
A1. I	.790	.145	.019	.071	.169	.207	.024	.073			.018	.003				

RANG 2. DOMALKALIC. KAMERUNASE.

1	46.04	12.23	3.86	4.60	10.38	8.97	2.42	5.77	2.87		0.64	1.14	trace	SO ₃ trace Cl 0.11 BaO 0.43 SrO 0.25	99.76	
A2. II	.767	.120	.024	.064	.260	.160	.039	.062			.008	.008	—			
2	43.72	13.85	5.26	7.61	5.64	9.76	4.11	4.77	0.81		3.66	0.76		SO ₃ 0.18	100.13	2.920
A2. II	.729	.136	.033	.106	.141	.174	.066	.051			.046	.005				
3	45.03	16.59	4.55	6.37	3.95	11.09	3.53	5.29	0.34	0.15	1.10	0.96	0.64	ZrO ₃ none Cl 0.26 F 0.11 S 0.05 BaO 0.16 SrO 0.16	100.33	
A1. I	.751	.163	.029	.089	.099	.198	.056	.056			.014	.007	.009			

RANG 2. DOMALKALIC. KAMERUNASE.

1	47.10	16.42	4.63	7.04	5.00	7.64	6.36	3.47	0.40		1.75	0.48	0.36		100.65	
A2. II	.785	.161	.029	.098	.125	.136	.103	.037			.022	.003	.005			
2	45.77	16.16	3.72	6.21	7.03	9.01	6.23	2.28	1.87		1.70	0.29	trace		100.27	
A2. II	.763	.158	.023	.086	.176	.161	.105	.024			.021	.002	—			
3	42.77	14.16	5.05	6.26	2.69	14.34	4.67	2.51	3.60		3.05	0.30			99.40	2.904
B2. III	.713	.139	.032	.087	.067	.255	.075	.027			.038	.002				
4	38.57	14.99	8.31	7.30	5.82	8.35	6.39	3.03	1.56		2.90	1.92	0.32	SO ₃ 0.37 Cl 0.33 BaO none SrO 0.15	100.36	2.95
A1. I	.643	.147	.052	.101	.148	.149	.103	.032			.036	.013	.005			
5	39.88	15.37	8.67	2.91	7.16	13.83	4.73	2.01	2.17		1.04	2.29	trace		100.06	2.918
A2. II	.665	.151	.054	.040	.179	.246	.076	.021			.013	.016	—			
6	44.42	13.33	9.14	6.35	5.74	10.60	5.60	1.81	1.75		1.63	0.35		S 0.18	100.35	3.008
A2. II	.740	.131	.057	.089	.144	.189	.090	.019			.020	.003				

ORDER 7. LENFELIC. KAMERUNARE—Continued.

SUBRANG 5. PERSODIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III.7.1''(4)5. 2.2.3.3.	or 8.34 di 33.03 ab 12.31 ol 1.27 an 3.06 mt 6.03 ne 28.26 il 2.13	Serravalle, n. Palagonia, Val di Noto, Sicily.	G. Ponte.	G. Ponte, Atti Ac. Gioen., (5), III, No. 4, p. 5, 1910.	Basalt.	Not described. Mode? 3 places.

SUBRANG 2. DOPOTASSIC. JUGOSE. (H. S. WASHINGTON, 1906.)

1	(II)III.7.2''2''. 2.2.2.3.	or 11.68 di 25.90 an 15.29 ol 6.11 lc 22.67 mt 3.25 ne 10.51 il 2.13 ap 1.68	Bottom of crater, Mount Vesuvius, Italy.	H. S. Washing- ton.	H. S. Washington, unpublished.	Leucite basanite.	Scoria of 1914.
2	III.7(8).2''2. ''2.1.3.2.	or 8.06 di 33.01 an 13.34 ol 4.04 lc 25.51 mt 4.41 ne 6.82 il 2.74 ap 1.01	Monte Jugo, n. Montefiascone, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 124, 1906.	Leucitite.	

SUBRANG 3. SODIPOTASSIC. CASCADOSE. (L. V. PIRSSON, 1905.)

1	III.7.2''2.(2)3. 2.2.2.2.	or 21.68 di 26.12 an 5.28 ol 12.72 lc 11.03 mt 5.57 ne 11.08 il 1.22 ap 2.69	Arrow Peak, Highwood Moun- tains, Montana.	H. W. Foote.	L. V. Pirsson, U. S. G. S. B. 237, 1905, p. 145.	Cascadite (minette).	In W. T., p. 347.
2	III.7.(1)2.3. 2.1.3.3.	or 18.35 di 30.51 an 5.28 ol 2.26 lc 7.85 mt 7.66 ne 18.74 il 6.99 ap 1.68	Mikeno, Lake Kivu District, German East Africa.	Eyme.	L. Finckh, D. Zent. Afr. Exp., I (1), 1912, p. 34.	Leucite basalt.	
3	''III.7.2''3. 2.2.3.3.	or 15.57 di 27.30 an 15.29 ol 3.11 lc 12.21 mt 6.73 ne 14.77 il 2.13 hl 0.47 ap 2.35	Near Ragou, Mount Mouriah, Java.	E. W. Morley.	J. P. Iddings, Ign. Rocks, II, p. 622, 1913.	Vicoite (leucite tephrite).	Also in Iddings and Morley, J. G., XXIII, p. 233, 1915,

SUBRANG 4. DOSODIC. KAMERUNOSE. (C. I. P. W., 1902.)

1	(II)III.7''7.(1)2.4. 2.2.2.3.	or 20.57 di 23.67 ab 8.91 ol 5.71 an 5.84 mt 6.73 ne 24.42 il 3.34 ap 1.01	Heum, Lougental, Norway.	V. Schmelck.	W. C. Bröggar, Eg. Kg., III, p. 91, 1899.	Heumite.	In W. T., p. 349.
2	III.7.7''2.4. 2.2.2.2.	or 13.34 di 27.77 ab 7.34 ol 6.88 an 8.06 mt 5.34 ne 25.94 il 3.19 ap 0.67	Kiose Aklungen, Lougental, Norway.	O. Heiden- reich.	W. C. Bröggar, Eg. Kg., III, p. 65, 1899.	Farrisite.	In W. T., p. 349.
3	III.(6)7.2.4. 2.1.4.3.	or 15.01 di 18.68 ab 4.19 wt 14.73 an 10.29 mt 7.42 ne 19.03 il 5.78 ap 0.67	Kiechlingsberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. G. L.-A. Bad., IV, p. 113, 1901.	Monchiquite.	In W. T., p. 349.
4	III.7.2.4.⊙ 3.2.2.3.	or 17.79 di 18.43 ab 1.57 ol 6.03 an 6.12 mt 12.06 ne 25.56 il 5.47 hl 0.59 ap 4.37 th 0.71	Michelsberg, Katzenbuckel, Odenwald.	O. N. Heiden- reich.	W. Freudenberg, Mt. G. L.-A. Bad., V, p. 267, 1907.	Shonkinite.	
5	III.7.2(3).4. 2.1.3.2.	or 6.39 di 30.02 an 15.01 ol 2.80 lc 4.14 mt 6.26 ne 21.58 il 1.98 hm 4.32 ap 5.35	Löbauerberg, Saxony.	J. Stock.	J. Stock, T. M. P. M., IX, p. 466, 1888.	Nephelite dolerite.	In W. T., p. 347.
6	III.(6)7''2.4''. 2.1.3.3.	or 10.56 di 34.19 ab 11.53 mt 13.22 an 6.12 il 3.04 ne 19.31 ap 1.01	Flurhübe, Duppau, Bohemia.	H. Tertsch.	F. Bauer, T. M. P. M., XXII, p. 281, 1903.	Theralite.	

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. KAMERUNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	40.10	15.27	10.13	1.85	4.59	12.08	4.78	3.34	2.93		3.64	0.87	0.08	CO ₂ 0.23	99.89	2.91
A2. II	.668	.150	.063	.026	.115	.216	.077	.035			.046	.006	.001			
8	39.97	17.30	7.41	3.05	3.82	10.53	5.14	3.56	4.11		3.34	0.84	0.09	CO ₂ 0.33 X 0.20 SO ₃ 0.06 Cl 0.14	99.89	2.86
A2. II	.666	.170	.046	.043	.096	.187	.063	.038			.042	.006	.001			
9	41.04	11.78	6.86	9.52	5.38	10.50	4.36	2.38	4.00		2.37	1.23			99.42	
A2. II	.684	.116	.043	.132	.135	.188	.070	.026			.030	.009				
10	38.99	11.80	8.96	9.48	7.42	11.34	3.92	1.62	1.88		2.99	1.32			99.72	
A2. II	.650	.116	.056	.132	.186	.203	.063	.017			.037	.009				

RANG 2. DOMALKALIC. KAMERUNASE.

1	44.26	16.48	5.01	11.34	5.73	8.03	6.30	0.88	1.59		0.47	trace	trace		100.09	
B2. III	.738	.162	.031	.157	.143	.143	.102	.009			.006	—	—			

RANG 3. ALKALICALCIC. ETINDASE. (C. I. P. W., 1902.)

1	44.89	12.73	3.31	4.35	13.71	12.95	1.02	3.66	1.59	0.27	0.95	0.23		CO ₂ none ZrO ₃ trace Cr ₂ O ₃ 0.03 BaO 0.08	99.77	
A2. II	.748	.125	.021	.061	.343	.231	.017	.039			.012	.002				

RANG 3. ALKALICALCIC. ETINDASE.

1	40.95	15.37	6.36	4.38	10.46	11.67	3.97	1.26	3.93	0.86	0.25	0.09	trace	Cr ₂ O ₃ 0.19 BaO 0.10	99.84	2.932
A2. II	.683	.150	.040	.061	.262	.209	.065	.014			.003	—	—			
2	39.75	13.34	4.00	8.55	14.81	10.90	3.41	0.75	1.26		3.42	0.17			100.36	
A2. II	.663	.131	.025	.119	.370	.195	.055	.008			.043	.001				
3	40.73	12.55	10.72	4.20	11.84	12.03	3.63	1.07	1.13		1.89	0.38			100.17	3.007
A2. II	.679	.123	.067	.058	.296	.214	.058	.012			.024	.003				
4	42.36	15.39	0.48	12.12	10.49	11.25	3.78	1.24	none		0.85	0.88	0.58	CO ₂ 0.38 SO ₃ none Cl 0.13	99.93	
A2. II	.706	.151	.003	.168	.262	.201	.061	.013			.011	.006	.003			
5	41.20	14.83	4.64	7.91	11.17	12.14	2.76	1.51	1.30		2.15	0.13			99.74	
A2. II	.687	.145	.029	.110	.279	.217	.045	.016			.027	.001				
6	40.53	14.53	1.27	11.11	8.58	13.45	3.25	2.67	1.04		2.85	0.69	0.58	CO ₂ 0.34 SO ₃ none Cl none	100.89	3.084
A2. II	.676	.142	.008	.154	.215	.240	.053	.029			.036	.005	.008			

ORDER 7. LENFELIC. KAMERUNARE—Continued.

SUBBRANG 4. DOSODIC. KAMERUNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	III.7.2."4. 3.1.3.2.	or 12.51 di 24.84 an 10.56 wo 2.67 lc 5.45 il 3.95 ne 21.87 hm 10.13 pf 2.72 ap 2.02	Etinde Volcano, Kamerun.	M. Dittrich.	E. Esch, Sb. Pr. Ak. W., p. 299, 1901.	Leucite nepheli- nite.	Fresh? In W. T., p. 349.
8	"III.7"2."4. 3.1.3.2.	or 10.01 di 20.74 an 13.62 wo 2.55 lc 8.72 mt 0.23 ne 23.57 il 6.38 hm 7.25 ap 2.02	Etinde Volcano, Kamerun.	M. Dittrich.	E. Esch, Sb. Pr. Ak. W., p. 299, 1901.	Leucite nepheli- nite.	In W. T., p. 349.
9	III.(6)7."2.4. 2.1.3.3.	or 14.46 di 31.15 ab 5.76 ol 4.46 an 5.56 mt 9.98 ne 16.76 il 4.56 ap 3.02	Clarendon, Otago, New Zealand.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., XLIV, p. 307, 1912.	Nephelinite.	
10	III(IV).(6)7.2.4. 2.2.2."3.	or 9.45 di 30.33 ab 4.19 ol 6.67 an 10.01 mt 12.99 ne 15.62 il 5.62 ap 3.02	Ponape Island, Caroline Islands.	Eyme.	E. Kaiser, Jb. Pr. G. L.-A., XXIV (1903), p. 112, 1907.	Nephelite basalt.	

SUBBRANG 5. PERSODIC.

1	III.(6)7.2"5. 2.3.2.3.	or 5.00 di 21.21 ab 14.15 ol 14.47 an 14.18 mt 7.19 ne 21.30 il 0.91	Gyenes Dias, Platten See, Hungary.	C. Preiss.	C. Preiss, Mt. Nw. Ver. Steierm. XLV, p. 28, 1909.	Basalt.	
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SUBBRANG 2. DQDOTASSIC. FLASCONOSE. (H. S. WASHINGTON, 1906.)

1	III"7.3.2. 1.2.2.2.	or 0.56 di 33.86 an 19.18 ol 15.63 lc 16.57 mt 4.87 ne 4.83 il 1.82 ap 0.63	Fiordine, Montefiascone, n. Lake Bolsena, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 127, 1906.	Leucite basanite.	
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SUBBRANG 4. DOSODIC. ETINDOSE. (C. I. P. W., 1902.)

1	III.7.3.4". 2.2.2.2.	or 2.22 di 30.13 an 19.74 ol 10.20 lc 4.36 mt 9.23 ne 18.46 il 0.46	Cerro Tacumbu, Paraguay.	A. Lindner.	L. Milch, T. M. P. M., XXIV, p. 214, 1905.	Limbargite.	Fresh?
2	III(IV).7.3.4(5). 2.3.2.2.	an 18.90 di 24.83 lc 3.49 ol 22.78 ne 15.62 cs 0.95 mt 5.80 il 6.54 ap 0.34	Rougiers, Var, France.	Pisani.	A. Michel Levy, C. R., CXLVIII, p. 1530, 1909.	Nephelinite.	
3	III(IV)."7."3.4". 2.2.2.2.	or 6.67 di 32.62 ab 1.31 ol 10.15 an 14.73 mt 7.89 ne 15.76 il 3.65 hm 5.23 ap 1.01	Schlossberg, Waldeck, Oberpfalz, Bavaria.	H. Waldeck.	H. Waldeck, In. Diss. Erl., p. 26, 1905.	Nephelite basalt.	
4	III.7.3.4". 1"3.2.3.	or 2.78 di 23.74 an 21.41 ol 26.30 lc 3.49 mt 0.70 ne 17.52 il 1.67 ap 2.02	Poratsch, n. Teplitz, Bohemia.	Not stated.	J. E. Hibsich, T. M. P. M., XXVII, p. 55, 1908.	Basalt.	
5	III.7.3"4. 2.2.2.2.	or 0.63 di 28.75 an 23.55 ol 15.27 lc 6.32 mt 6.73 ne 12.78 il 4.10 ap 0.34	Lobosch, Mittelgebirge, Bohemia.	C. F. Eichleiter.	G. Irgang, T. M. P. M., XXVIII, p. 53, 1909.	Nephelite basalt.	
6	III.7(8)."3(3)4. 2.3.2.3.	an 16.68 di 19.34 lc 12.64 ol 20.11 ne 15.05 cs 6.71 mt 1.86 il 5.47 ap 1.68	Radischken, n. Leitmeritz, Bohemia.	F. Hanusch.	Hibsich and Seeman, T. M. P. M., XXXII, p. 71, 1913.	Leucite basalt.	

CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC. ETINDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	39.33	15.26	6.36	5.99	9.78	14.52	3.47	1.53	2.54		1.01	0.93		CO ₂ 0.12	100.84	3.082
A2. II	.656	.150	.040	.083	.245	.259	.056	.016			.013	.006				
8	41.28	17.12	3.98	5.63	9.27	12.96	3.19	1.96	3.11		1.64	0.19		CO ₂ 0.21	100.54	
A2. II	.688	.168	.025	.078	.232	.231	.051	.021			.021	.001				
9	39.11	13.35	3.25	8.65	12.61	14.70	2.82	0.85	2.12		2.51	0.70			100.67	
A2. II	.652	.131	.020	.120	.315	.263	.045	.009			.031	.005			(100.72)	
10	42.61	12.08	4.12	7.73	10.60	13.36	2.78	1.98	0.54	0.17	3.64	0.73			100.34	
A2. II	.710	.118	.026	.107	.265	.239	.045	.021			.046	.005				
11	41.10	14.82	2.35	10.38	9.43	10.56	3.94	1.28	2.31	0.39	3.20	0.19	0.14	CO ₂ 0.26 SO ₃ 0.09 Cl trace Cr ₂ O ₃ trace V ₂ O ₅ 0.01 NiO trace BaO 0.06 SrO trace	100.50	2.994
A1. I	.685	.145	.015	.144	.236	.189	.064	.014			.040	.001	.002			
12	36.03	15.19	5.94	9.55	8.60	15.52	4.23	1.85	0.58		1.13	1.38	0.17	ZrO ₂ 0.21	100.38	3.079
A2. II	.601	.149	.037	.133	.215	.277	.068	.020			.014	.010	.002			
13	43.62	16.75	1.83	9.36	7.96	10.23	4.73	1.60	0.84	1.72	0.42	trace	0.22	CO ₂ 0.28	99.56	2.83
A2. II	.727	.164	.011	.130	.199	.182	.076	.017			.005	—	.003			

RANG 4. DOALCIC.

1	42.41	16.18	3.94	8.85	7.04	13.56	1.30	3.64	1.36		1.60	0.35		SO ₃ trace	100.23	3.048
A2. II	.707	.159	.025	.123	.176	.242	.021	.038			.020	.002				

CLASS III. SALFEMANE.

RANG 1. PERALKALIC. CHOTASE. (C. I. P. W., 1902.)

1	46.51	11.86	7.59	4.39	4.73	7.41	2.39	8.71	2.45	1.10	0.83	0.80	0.22	CO ₂ none SO ₃ 0.05 Cl 0.04 F trace NiO 0.04 BaO 0.50 SrO 0.16 CuO trace	99.78	
A1. I	.775	.116	.048	.061	.118	.132	.039	.093			.010	.006	.003			
2	45.18	9.31	6.31	4.08	10.77	8.56	1.73	6.93	1.01	0.55	4.36	0.51	trace	CO ₂ 0.17 ZrO ₂ none SO ₃ none Cl 0.05 F none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.02 NiO none BaO 0.30 SrO trace Li ₂ O none CuO 0.01	99.87	2.980
A1. I	.753	.091	.039	.057	.264	.153	.028	.074			.055	.004	—			

ORDER 7. LEUFELIC. KAMERUNARE—Continued.

SUBRANG 4. DOSODIC. ETINDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	III.7.3.4.⊙ 2.2.2.2.	an 21.68 di 23.25 lc 6.98 ol 12.44 ne 15.90 cs 4.64 mt 9.28 il 1.82 ap 2.02	Grosswöhlen, Bohemia.	R. Pfohl.	J. E. Hibschi, T. M. P. M., XVII, p. 49, 1897.	Nephelite basalt.	In W. T., p. 357.
8	III.7.3''4. 2.2.2.2.	an 26.69 di 24.21 lc 9.16 ol 11.36 ne 14.48 cs 2.06 mt 5.80 il 3.19 ap 0.34	Ujmalodova, Banat, Hungary.	K. Emszt.	Emszt and Rozloznsnik, F. K., XLIII, p. 497, 1913.	Nephelite basalt.	
9	III(IV).7.3(4).4''. 2.3.2.2.	an 21.41 di 21.06 lc 3.92 ol 21.89 ne 12.78 cs 6.36 mt 4.64 il 4.71 ap 1.68	Cap Manuel, Cap Verde, Senegal.	Pisani.	J. Chantard, C. R., CXLIII, p. 921, 1906.	Linburgitic basalt.	
10	III(IV).''7.3.''4. 2.2.2.2.	or 7.51 di 37.36 an 14.46 ol 9.58 lc 3.27 mt 6.03 ne 12.78 il 6.99 ap 1.68	Tsiakakafo, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Tephrite.	
11	III.''7.3.4''. 2.2.2.3.	or 7.23 di 27.13 an 18.90 ol 16.14 ne 18.18 mt 3.48 il 6.08	Fernhill, Canterbury, New South Wales.	H. P. White.	G. W. Card, Rec. G. S. N. S. W., VII, p. 97, 1902.	Analcite basalt.	
12	III.7(8).''3.4. 2.5.3.(2)3.	an 16.96 di 4.94 lc 8.72 ol 21.89 ne 19.31 cs 13.76 Z 0.37 mt 8.58 il 2.13 ap 3.36	Shannon Tier, Hobart, Tasmania.	Heidenreich.	F. P. Paul, T. M. P. M., XXV, p. 312, 1906.	Nephelite- eudialyte basalt.	Cf. No. 1, IV.2.4.2.3.
13	III.''7.''3.4''. 1.3.2.3.	or 9.45 di 25.29 ab 1.05 ol 16.78 an 19.74 mt 2.55 ne 21.02 il 0.76	Adams Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islids., p. 736, 1909.	Camptonite.	

SUBRANG 1-2. PREPOTASSIC.

1	III.7.(3)4.2(3). 2.2.2.3.	an 27.80 di 27.29 lc 16.47 ol 10.65 ne 5.96 cs 1.20 mt 5.80 il 3.04 ap 0.67	Brocken, Harz.	Eyme.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXXII (2), p. 339, 1912.	Inclusion in granite.	
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ORDER 8. FELDOLENIC. BOHEMARE. (C. I. P. W., 1902.)

ORDER 2. DOPOTASSIC. CHOTOSE. (C. I. P. W., 1902.)

1	III.8.1.2.⊙ 2.1.3.3.	or 13.90 ac 7.39 lc 29.65 di 25.42 ne 6.53 ol 1.88 mt 7.42 il 1.52 ap 2.02	Bearpaw Peak, Bearpaw Moun- tains, Montana.	H. N. Stokes.	Weed and Pirsson, A. J. S., II, p. 147, 1896.	Leucitite.	In W. T., p. 351.
2	III(IV).8.1.''2. 2.2.2.2.	or 10.29 ac 5.08 lc 24.20 di 30.24 ne 4.83 ol 8.68 mt 0.46 il 8.36 hm 4.16 ap 1.34	Byerock, New South Wales.	J. C. H. Min- gaye.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 302, 1904.	Leucite basalt.	

CLASS III. SALFEMANE—Continued.

RANG 1. PERALKALIC. CHOTASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3	44.68	11.43	7.00	4.67	10.25	9.44	1.56	5.68	2.73	0.77	0.84	0.66	0.11	CO ₂ 0.20 ZrO ₂ none SO ₃ none Cl 0.11 F none S none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.02 NiO trace BaO 0.02 SrO none Cu none	100.19	2.944
A1. I	.745	.112	.044	.065	.256	.169	.025	.061			.011	.005	.002			

RANG 1. PERALKALIC. CHOTASE.

1	45.30	16.44	1.82	8.82	2.73	7.85	8.60	4.05	2.96		0.71	1.68			100.96	
A2. II	.755	.161	.011	.122	.068	.140	.139	.043			.009	.012				

RANG 1. PERALKALIC. CHOTASE.

1	47.16	15.05	0.87	11.00	6.34	9.11	7.73	1.32	0.42		1.01	0.06	0.02		100.09	2.912
A2. II	.786	.148	.005	.153	.159	.163	.124	.014			.013	—	—			

RANG 2. DOMALKALIC. ALBANASE. (C. I. P. W., 1902.)

1	46.24	14.42	4.06	4.36	6.99	13.24	1.65	6.37	0.78	0.57	1.17	0.41		CO ₂ none ZrO ₂ trace SO ₃ 0.02 BaO 0.13	100.41	
A2. II	.771	.141	.025	.061	.175	.237	.027	.068			.015	.003				
2	45.99	16.56	4.17	5.38	5.30	10.47	2.18	8.97	0.45		0.37	0.56		CO ₂ none BaO 0.25 SrO none	100.65	
A2. II	.767	.162	.026	.075	.133	.188	.035	.096			.005	.004				
3	46.27	17.25	3.94	3.23	5.08	11.40	2.67	8.58	0.37	0.13	1.11	0.39		CO ₂ none ZrO ₂ 0.03 SO ₃ trace BaO 0.10 SrO 0.05	100.61	
A1. I	.771	.169	.025	.044	.127	.204	.044	.091			.014	.003				
4	47.05	17.08	3.04	4.89	5.67	10.63	1.61	7.52	0.71	0.22	1.15	0.17		CO ₂ none ZrO ₂ 0.02 SO ₃ none S none NiO 0.05 BaO 0.09 Cu none	99.90	
A1. I	.784	.167	.019	.068	.142	.189	.026	.080			.014	.001				

RANG 2. DOMALKALIC. ALBANASE.

1	43.22	15.14	9.57	2.62	3.33	14.35	2.94	7.18			2.72				101.07	
B3. IV	.720	.149	.060	.036	.083	.256	.047	.077			.034					
2	36.36	11.67	6.62	5.36	13.58	9.48	3.59	3.74			6.18	trace		Cr ₂ O ₃ 2.93	99.61	3.078
A2. II	.606	.115	.041	.075	.340	.169	.058	.039			.075	—				
3	40.21	11.86	2.96	5.96	11.80	13.22	2.74	3.17	2.88		3.10	1.98			99.88	
A2. II	.670	.116	.019	.083	.295	.236	.044	.034			.039	.014				
4	48.00	16.10	3.35	4.90	6.53	11.35	3.04	5.26	0.25		1.02			Cl 0.49	100.29	
A2. II	.800	.158	.021	.068	.163	.203	.048	.056			.013					

ORDER 8. FELDOLINIC. BOHEMARE—Continued.

SUBRANG 2. DOPOTASSIC. CHOTOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	III.8.1.2.⊙ 2.2.2.2.	or 13.90 di 31.11 an 7.23 ol 8.91 lc 15.70 mt 10.21 ne 7.10 il 1.67 ap 1.68	Lake Cudgellico District, County Darling, New South Wales.	W. A. Greig.	G. W. Card, pers. com.	Leucite basalt.	

SUBRANG 4. DOSODIC.

1	III.8.1.4. 2.2.3.2.	or 14.46 ac 5.08 lc 7.41 ns 1.22 ne 33.51 di 23.58 ol 7.30 il 1.37 ap 4.03	Omimi, Otago, New Zealand.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., XLIV, p. 307, 1912.	Nephelinite.	
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ORDER 5. PERSODIC. TAVOSE. (V. HACKMAN, 1905.)

1	III.(7)8.1''.(4)5. 1.2.2.3.	or 7.78 di 35.29 ab 7.34 ol 11.05 an 2.78 mt 1.16 ne 31.24 il 1.98	Serravalle, n. Palagonia, Valdi Noto, Sicily.	G. Ponte.	G. Ponte, At. Ac. Gioen. (5), III, No. X, p. 5, 1910.	Basalt glass (palagonite).	
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SUBRANG 2. DOPOTASSIC. ALBANOSE. (C. I. P. W., 1902.)

1	III.8.2''2. 2.2.3.2.	an 12.79 di 36.22 lc 29.65 ol 2.27 ne 7.67 cs 1.38 mt 5.80 il 2.28 ap 1.01	Monte Rado, n. Lake Bolsena, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 131, 1906.	Leucitite.	
2	(II)III.8(9).2.2. 2.2(3)''8.2(3).	an 8.62 di 20.14 lc 41.86 ol 6.79 ne 9.94 cs 4.64 mt 6.03 il 0.76 ap 1.34	Capo di Bove, Alban Hills, Italy.	H. S. Washing- ton.	H. S. Washington, A. J. S., IX, p. 53, 1900.	Cecilite (melilite leucitite).	Also in R. C. R., 1906, p. 139. In W. T., p. 351.
3	(II)III.8''2.2''. 2.2.3.2.	an 9.45 di 22.81 lc 39.68 ol 1.02 ne 12.50 cs 4.64 mt 5.80 il 2.13 ap 1.01	Ticchiena, n. Frosinone, Hernican Dis- trict, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 135, 1906.	Leucitite.	
4	(II)III.(7)8.2(3).2. 2.1.3.2.	or 3.89 di 27.80 an 16.96 ol 3.96 lc 31.83 mt 4.41 ne 7.38 il 2.13 ap 0.34	Pofi, Hernican District, Italy.	H. S. Washing- ton.	H. S. Washington, R. C. R., p. 135, 1906.	Leucitite.	

SUBRANG 3. SODIPOTASSIC.

1	III.8(9)''2.(2)3. 2.2.4.2.	an 6.95 di 17.93 lc 33.57 wo 6.50 ne 13.35 cs 7.91 mt 0.46 il 5.17 hm 9.28	Aultivullin, Assynt, Scotland.	A. Gemmell.	A. Gemmell, Tr. Edin. G. Soc., IX, (5), p. 417, 1910.	Borolanite granulite.	
2	III(IV).8(9)''2. 3(4). 2.4.2.2.	an 5.00 di 13.39 lc 17.00 ol 19.46 ne 16.47 cs 6.02 il 8.51 hm 6.62 cm 3.95 pl 2.58	Neuhöwen, Hegau, Baden.	U. Gruben- mann.	U. Grubenmann, In. Diss. Zür., p. 28, 1886.	Melilite basalt.	Ignit.=2.01. In W. T., p. 351.
3	III(IV).8.2''3'. 2.2.2.2.	an 10.56 di 29.48 lc 14.82 ol 13.43 ne 12.50 cs 1.38 mt 4.41 il 5.93 ap 4.76	Güntersberg, Langeberg, Hesse Nassau.	M. Dittrich.	R. Bernges, N. J. B. B., XXXI, p. 627, 1911.	Trachy- dolerite.	
4	III.8.2''3. ''2.1.3.2.	or 13.90 di 33.01 an 13.34 ol 3.62 lc 13.52 mt 4.87 ne 15.34 il 1.98	Eruption of 1906, Mount Vesuvius, Italy.	Pisani.	A. Lacroix, C. R., CXLIII, p. 17, 1906.	Leucite tephrite ashes.	Also in N. Arch. Mus. (4), IX, p. 61, 1907.

CLASS III. SALFEMANE—Continued.

RANG 2. DOMALKALIC. ALBANASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
I	41.75	17.04	6.35	3.41	4.71	14.57	6.17	3.98	0.62	0.28	0.58	1.09	trace	CO ₂ none ZrO ₂ 0.05 S none BaO none	100.60	3.084
A2. II	.696	.167	.040	.047	.118	.260	.098	.042			.007	.008	—			
2	38.89	12.69	7.46	2.96	5.01	18.65	4.90	2.19	0.70	0.36	2.45	1.78	0.16	CO ₂ 0.66 ZrO ₂ 0.02 SO ₃ 0.25 S 0.60 BaO none SrO none	99.73	
A1. I	.648	.125	.047	.041	.125	.333	.079	.023			.031	.013	.002			
3	35.82	18.04	9.92	2.02	0.77	17.18	6.30	3.04	0.82	0.42	4.41	0.08	0.19	CO ₂ 0.48 ZrO ₂ 0.05 S 0.03 Cr ₂ O ₃ none V ₂ O ₅ 0.05 BaO none SrO none	99.82	3.151
A1. I	.597	.177	.062	.028	.019	.307	.102	.032			.055	—	.003			
4	39.25	16.01	4.31	9.64	4.24	13.42	4.92	2.26	0.80	4.02	0.91	0.35			100.13	
A2. II	.654	.157	.027	.134	.106	.239	.079	.024		.050	.006	.005				
5	37.96	14.36	7.87	6.95	10.21	10.56	5.21	1.89	1.56	2.01	1.61				100.19	
A2. II	.636	.141	.049	.097	.255	.189	.084	.020		.025	.011					
6	38.57	15.69	8.60	9.09	8.62	9.29	5.10	1.81	0.93		1.30	0.47	0.24	CO ₂ 0.12	99.83	
A2. II	.643	.154	.054	.126	.216	.166	.082	.020			.016	.003	.003			
7	43.07	14.14	3.47	7.21	8.55	12.26	4.60	2.70	1.64		2.00	0.40			100.04	
A2. II	.718	.139	.022	.100	.214	.219	.074	.029			.025	.003				
8	40.80	17.27	3.15	9.32	5.13	10.19	6.97	2.30	1.96		2.02	0.14			99.25	
A2. II	.680	.169	.020	.129	.128	.182	.113	.024			.025	.001				
9	40.15	17.32	7.25	4.00	4.43	11.78	5.99	3.78	1.18		3.21	0.71	0.08	CO ₂ 0.15 ZrO ₂ 0.35	100.38	3.01
A2. II	.669	.170	.045	.056	.111	.210	.097	.040			.040	.005	.001			
10	38.39	12.64	7.40	6.15	6.46	14.17	4.35	2.44	1.62		4.44	1.16		CO ₂ 0.23 SO ₃ 0.47 Cl 0.37	100.31	3.10
A2. II	.640	.124	.046	.086	.162	.253	.070	.026			.056	.008				
11	35.66	11.97	5.19	9.69	8.35	14.39	3.65	1.89	4.04		3.74	1.37	0.30		100.24	
A2. II	.594	.118	.033	.135	.209	.257	.059	.020			.047	.010	.004			
12	36.00	14.51	7.19	10.28	4.02	12.95	3.61	3.04	4.40		2.50	1.56			100.06	
A2. II	.600	.142	.045	.143	.101	.231	.058	.032			.031	.011			(100.08)	

RANG 2. DOMALKALIC. ALBANASE.

1	46.15	13.25	1.29	8.54	7.82	13.89	5.77	0.93	2.01		0.36	0.15	0.22	CO ₂ trace S trace	100.37	
A2. II	.769	.130	.008	.119	.196	.248	.093	.010			.005	.001	.003			

ORDER 8. FELDOLLENIC. BOHEMARE—Continued.

SUBRANG 4. DOSODIC. COVOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III.8(9).2.4. 2.2.3.2.	an 7.51 di 25.06 lc 18.31 ol 0.14 ne 27.83 cs 7.74 mt 9.28 il 1.06 ap 2.69	Magnet Cove, Arkansas.	H. S. Washing- ton.	H. S. Washington, B. G. S. A., XI, p. 399, 1900.	Ijolite.	In W. T., p. 353.
2	III(IV).8''/2.4. 2.2.3.2.	an 6.39 di 27.00 lc 10.03 wo 1.86 ne 22.44 cs 12.10 mt 2.78 il 4.71 hm 5.60 ap 4.37	North Beaver Creek, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. B. 591, p. 135, 1915.	Ijolite.	Fresh?
3	III.8.2.4.⊙ 3.3.4.3.	an 11.95 di 4.10 lc 13.95 wo 7.08 ne 28.97 cs 13.76 il 4.71 hm 9.92 pf 3.26	Iron Hill area, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Garnet- nephelite rock.	
4	III.'8.2''/4. 2.2.3.3.	an 15.01 di 28.69 lc 10.46 ol 3.35 ne 22.44 cs 3.44 mt 6.26 il 7.60 ap 2.02	Ice River, British Columbia.	N. N. Evans.	A. E. Barlow, Ottawa Naturalist, XVI, p. 75, 1902.	Ijolite.	
5	III''8.2.4. 2.2.2.2.	or 0.83 di 25.16 an 10.29 ol 11.82 lc 8.07 mt 11.37 ne 23.86 il 3.80 ap 3.70	Küppchen, n. Heiligenberg, Niederhessen.	C. Trenzen.	C. Trenzen, N. J., II, p. 32, 1902.	Nephelite basalt.	
6	III.8.2''/4. 2.2.2.2.	an 14.16 di 23.16 lc 8.72 ol 13.15 ne 23.28 mt 12.53 il 2.43 ap 1.01	Budikow, Polzen District, Bohemia.	K. H. Scheu- mann.	K. H. Scheumann, Ab. Sächs. Ges. W., XXXII, p. 758, 1913.	Melilite- nephelite basalt.	
7	III.8.2.4.⊙ 2.2.2.2.	an 10.01 di 36.05 lc 12.64 ol 7.99 ne 21.02 cs 9.86 mt 5.10 il 3.80 ap 1.01	Coral Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, N. Arch. Mus., III, p. 81, 1911.	Micro- gabbro.	
8	III.8''2.4''. 2.2.2.3.	an 8.90 di 26.28 lc 10.46 ol 8.04 ne 32.09 cs 2.75 mt 4.64 il 3.80 ap 0.34	Topsail Point, Tamara Island, Los Islands, New Guinea.	Lassieur.	A. Lacroix, N. Arch. Mus., III, p. 77, 1911.	Shonkinite.	
9	III.8''2.4''. 2.2.3.2.	an 9.17 di 23.98 lc 17.44 wo 0.81 ne 27.55 cs 3.78 mt 3.94 il 6.08 hm 4.48 ap 1.68	Etinde Volcano, Kamerun.	M. Dittrich.	E. Esch, Sb. Pr. Ak. W., p. 415, 1901.	Nephelinite.	In W. T., p. 353.
10	III''8.2.4. 2.1.3.2.	an 10.84 di 34.99 lc 11.34 wo 0.81 ne 16.76 cs 1.55 hl 0.59 mt 6.96 th 0.85 il 8.51 hm 2.56 ap 2.69	Etinde Volcano, Kamerun.	M. Dittrich.	E. Esch, Sb. Pr. Ak. W., p. 299, 1901.	Nephelinite.	In W. T., p. 353.
11	III(IV).8.2''/4. 2.3.3.3.	an 10.84 di 20.51 lc 8.72 ol 13.57 ne 16.76 cs 8.08 mt 7.66 il 7.14 ap 3.36	Nagahama, Iwami Province, Japan.	K. Yokoyama.	S. Kozu, pers. com.	Nephelite basalt.	Fresh?
12	III.'8.2(3).(3)4. 2.2.3.2.	an 14.46 di 22.20 lc 13.95 ol 5.73 ne 16.47 cs 3.78 mt 10.44 il 4.71 ap 3.70	Lake Waiholo, Otago, New Zealand.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., XLIV, 307, 1912.	Nephelinite.	Fresh?

SUBRANG 5. PERSODIC.

1	III(IV).8.2.(4)5. 1.1.3.3.	or 2.50 di 49.59 an 7.51 ol 7.08 ne 2.40 mt 1.86 ne 26.41 il 0.76 ap 0.34	Grenada, West Indies.	J. B. Harrison.	J. B. Harrison. Rocks of Gren., London, p. 10, 1896.	Nephelite tephrite.	Augite andesite in orig. Corr. by J. B. H., pers. com. In W. T., p. 353.
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CLASS III. SALFEMANE—Continued.

RANG 3. ALKALICALCIC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	39.98	12.47	7.06	6.43	6.59	11.85	1.70	3.80	3.71		5.42	0.73		SO ₃ 0.14	99.88	2.901
A2. II	.666	.122	.044	.089	.165	.212	.027	.040			.068	.005				

RANG 3. ALKALICALCIC.

1	40.72	15.03	5.52	6.86	8.29	13.95	4.01	2.34	0.32	0.12	0.99	1.75	0.18	CO ₂ none	100.08	
A2. II	.679	.147	.034	.095	.207	.249	.065	.024			.012	.012	.003			
2	35.65	13.24	6.68	7.64	14.38	13.17	3.64	1.77	1.02		1.74	0.86	0.29	CO ₂ 0.47 SO ₃ 0.23 Cl 0.03	100.81	
A2. II	.594	.130	.042	.106	.360	.236	.059	.019			.022	.006	.004			
3	37.51	14.38	6.33	7.64	12.17	14.36	3.62	1.48	1.08		1.16	0.64			100.37	3.034
A2. II	.625	.141	.040	.106	.304	.256	.058	.016			.015	.005				
4	36.15	15.18	4.87	9.11	13.63	11.40	2.42	1.81	1.95	0.37	2.30	0.26	0.33	SO ₃ 0.49 Cr ₂ O ₃ 0.10 BaO 0.06	100.43	3.205
A1. I	.603	.149	.031	.126	.341	.204	.039	.019			.029	.002	.005			
5	37.84	13.81	6.20	8.01	4.79	14.60	3.73	1.96	4.53	0.38	2.80	1.50	0.11	CO ₂ 0.02 ZrO ₃ none SO ₃ none Cl trace Cr ₂ O ₃ none V ₂ O ₅ 0.04 NiO none BaO 0.04 SrO none Li ₂ O none	100.36	2.949
A1. I	.631	.135	.039	.111	.120	.261	.060	.021			.035	.011	.002			

RANG 4. DOALCIC.

1	39.45	15.51	0.35	10.79	10.69	12.80	3.00	0.65	1.87		1.72	1.65	1.02	CO ₂ 0.27 SO ₃ none Cl 0.04	99.81	
A2. II	.658	.152	.002	.150	.267	.229	.048	.007			.022	.012	.013			

CLASS III. SALFEMANE.

ORDER 1. PERALKALIC. IJOLASE. (C. I. P. W., 1902.)

1	42.65	9.14	5.13	1.07	10.89	12.36	0.90	7.99	2.18	2.04	1.64	1.52	0.12	SO ₃ 0.58 Cl 0.03 F 0.47 Cr ₂ O ₃ 0.07 BaO 0.89 SrO 0.33 Ce ₂ O ₃ 0.11	100.11	2.857
A1. I	.711	.090	.032	.017	.272	.220	.014	.085			.021	.011	.002			

ORDER 1. PERALKALIC. IJOLASE.

1	39.59	17.33	2.53	8.19	3.15	9.79	6.70	7.63	0.43		2.45	1.10		CO ₂ 0.68 SO ₃ 0.07 S 0.08	99.72	2.908
A2. II	.660	.170	.016	.114	.079	.175	.108	.081			.031	.008				

ORDER 8. FELDOLINIC. BOHEMARE—Continued.

SUBRANG 3. SODIPOTASSIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III''8.3.(2)3. 3.1.3.2.	or 9.45 di 32.40 lc 15.29 ol 1.12 lc 10.03 mt 4.87 ne 7.67 il 10.34 hm 3.68 ap 1.68	Wissoke, Lake Kivu District, German East Africa.	Klüss.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 30, 1912.	Leucitite.	

SUBRANG 4. DOSODIC.

1	III.(7)8.(2)3.4. 2.2.2.2.	an 16.12 di 31.36 lc 10.46 ol 9.03 ne 18.46 mt 7.89 il 1.52 ap 4.03	Yankee, Colfax County, New Mexico.	G. Steiger.	J. B. Mertie, U. S. G. S. B. 591, p. 151, 1915.	Nephelite basalt.	
2	III(IV).(7)8.(2)3.4. 2.5.2.2.	an 14.46 di 1.76 lc 8.28 ol 29.30 ne 16.76 cs 14.42 mt 9.74 il 3.34 ap 2.02	Modlibov, Polzen District, Bohemia.	K. H. Scheu- mann.	K. H. Scheumann, Ab. Sächs. Ges. W., XXXII, p. 759, 1913.	Polzenite (melilite basalt).	
3	III''8.3.4. 2.2.2.2.	an 18.63 di 10.49 lc 6.98 ol 22.90 ne 16.47 cs 10.66 mt 9.28 il 2.28 ap 1.68	Schwarzbrunn, Gablonz, Bohemia.	R. Reinisch.	R. Reinisch, T. M. P. M., XXV, p. 536, 1906.	Nephelite basalt.	Center of dike. Cf. No. 13, III.5.5.5.
4	III''8.3(4)''4. 2.5.2.2.	an 25.30 di 1.76 lc 8.28 ol 30.52 ne 11.08 cs 8.43 mt 7.19 il 4.41 ap 0.67	Spiegel River, Cape Colony.	J. Lewis.	Rogers and Dutoit, A. R. G. Com. Cape G. H., VIII, p. 51, 1904.	Melilite basalt.	
5	III''(7)8.(2)3.4. 2.1.3.2.	an 15.01 di 34.70 lc 9.16 ol 0.31 ne 17.04 cs 1.29 mt 9.05 il 5.32 ap 3.70	Dapto, New South Wales.	H. P. White.	G. W. Card, pers. com.	Nephelinite.	

SUBRANG 4-5. PRESODIC.

1	III.(7)8.(3)4.4(5). 2.3.2.3.	an 26.97 di 20.89 lc 3.05 ol 25.40 ne 13.63 mt 0.46 il 3.34 ap 4.03	Quickau, n. Teplitz, Bohemia.	Not stated.	J. E. Hibsch, T. M. P. M., XXXVII, p. 55, 1908.	Basalt.	
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ORDER 9. PERLENIC. FINNARE. (C. I. P. W., 1902.)

SUBRANG 1. PERPOTASSIC. MADUPOSE. (C. I. P. W., 1902.)

1	III''9.1.1(2). 2.3.3.5.	lc 37.06 ac 0.92 ne 1.42 di 26.14 th 0.99 ol 10.50 cs 6.02 il 2.89 hm 4.80 ap 3.70 pi 0.27	Pilot Butte, Leucite Hills, Wyoming.	W. F. Hille- brand.	W. Cross, A. J. S., IV, p. 130, 1897.	Madupite.	In W. T., p. 353.
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SUBRANG 3. SODIPOTASSIC. KIVOSE. (H. S. WASHINGTON, 1902.)

1	III.9.1.3. ''2.4.3.3.2.	lc 21.36 ac 7.39 ne 25.28 ns 0.37 kp 10.11 ol 13.99 cs 12.73 il 4.71 ap 2.69	Niragongo, Lake Kivu District, German East Africa.	Klüss.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 28, 1912.	Leucite ijolite.	
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CLASS III. SALFEMANE—Continued.

ORDER 1. PERALKALIC. IJOLASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	40.74	18.52	3.66	6.07	3.83	5.61	9.83	4.71	1.46		3.21	1.61			99.25	2.88
B2. III	.679	.182	.023	.085	.096	.100	.158	.050			.040	.011				
2	39.36	13.16	6.39	7.68	6.06	8.55	7.18	3.42	1.43		4.47	1.69			99.39	2.94
B2. III	.656	.129	.040	.107	.152	.153	.116	.036			.056	.012				
3	35.59	12.90	7.68	9.28	5.40	8.46	8.35	2.78	1.63		5.98	2.13			100.18	2.941
A2. II	.593	.126	.048	.129	.135	.151	.135	.030			.075	.015				
4	43.70	19.77	3.35	3.47	3.94	10.30	9.78	2.87	0.89		0.89	1.34	trace		100.30	
A2. II	.728	.195	.021	.049	.099	.184	.158	.030			.011	.009	—			
5	39.26	15.75	4.88	3.14	3.62	16.60	7.50	3.03	0.94		1.66	3.28		SO ₃ trace	99.66	2.993
A2. II	.654	.154	.031	.043	.091	.296	.121	.032			.021	.023				

ORDER 1. PERALKALIC. IJOLASE.

1	42.07	18.68	1.68	4.39	3.53	10.83	11.00	1.87	1.20		1.00	2.44			99.66	
A2. II	.701	.183	.011	.061	.088	.193	.177	.020			.013	.017				

CLASS III. SALFEMANE.

SECTION 5. Z EXTREME OVER C.

RANG 1. PERALKALIC. KAKORTOKASE. (H. S. WASHINGTON, 1917.)

1	49.39	10.39	4.31	7.72	none	5.11	11.45	2.62	1.24	0.22	0.49	none	0.97	ZrO ₂ 4.89 Cl 0.51 F 0.75 Nb ₂ O ₅ 0.30	100.36	2.85
A1. I	.823	.102	.027	.107	—	.091	.185	.028			.006	—	.014			

CLASS IV. DOFEMANE. (C. I. P. W., 1902.)

RANG 1. PERMIRIC. MINNESOTASE. (C. I. P. W., 1902.)

1	56.98	1.73	4.04	4.18	27.40	3.26	0.59	0.35	2.04		none			Cr ₂ O ₃ 0.09	100.66	
A3. III	.950	.017	.025	.058	.685	.058	.010	.004			—					
2	55.27	4.13	0.45	7.17	28.36	2.93	0.86	0.18	0.30	0.04	0.16		0.03	FeS ₂ 0.17	100.05	3.25
A2. II	.921	.040	.003	.100	.709	.052	.014	.002			.002		—			

RANG 1. PERMIRIC. MINNESOTASE.

1	50.64	7.93	1.41	14.82	18.58	3.41	0.96	0.21	0.87		0.82	0.27	0.16	Cr ₂ O ₃ 0.05	100.13	
A2. II	.844	.078	.009	.206	.465	.061	.013	.002			.010	.002	.002			
2	52.27	6.81	2.48	10.01	23.29	2.04	0.87	0.25	0.61	0.14	0.40	trace	trace	CO ₂ 0.13 S 0.05 Cr ₂ O ₃ 0.22	99.57	
A2. II	.871	.067	.016	.139	.582	.037	.014	.003			.005	—	—			

ORDER 9. PERLENIC. FINNARE—Continued.

SUBRANG 4. DOSODIC. IIVAA ROSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	III(IV).9.1.4. 2.3.2.3.	lc 21.80 ac 10.63 ne 37.49 ns 0.37 di 4.08 ol 9.56 cs 3.96 il 6.08 ap 3.70	Michelsberg, Katzenbuckel, Odenwald.	G. Latterman.	W. Freudenberg, Mt. G. L.-A. Bad., V (1), p. 279, 1907.	Nephelite- rich schlieren in shonk- inite.	
2	III''9.1.4. 2.2.2.3.2.	lc 15.70 ac 10.63 ne 26.41 ol 18.35 di 7.22 cs 2.58 mt 3.94 il 8.51 ap 4.03	Michelsberg, Katzenbuckel, Odenwald.	G. Latterman.	W. Freudenberg, Mt. G. L.-A. Bad., V (1), p. 267, 1907.	Shonkinite.	
3	III(IV).9.1.4. 2.3.2.3.2.	lc 9.59 ac 18.02 ne 27.26 ol 14.04 kp 2.53 cs 8.77 mt 2.09 il 11.40 ap 5.04	Gaffstein, Katzenbuckel, Odenwald.	G. Latterman.	W. Freudenberg, Mt. G. L.-A. Bad., V (1), p. 223, 1907.	Nephelite basalt.	
4	(II)III.(8)9.1.4''. 2.1.3.2.	or 4.17 di 25.60 an 1.95 wo 3.60 lc 10.03 mt 4.87 ne 44.87 il 1.67 ap 3.02	Iivaara, Kuosamo, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., No. 11, p. 17, 1900.	Ijolite.	In W. T., p. 353.
5	III.9.1.4.⊙ 2.2.4.2.	an 0.28 di 19.66 lc 13.95 wo 8.47 ne 34.36 cs 4.64 mt 5.10 il 3.19 hm 1.44 ap 7.73	Kelimassi, German East Africa.	Eyme.	L. Finckh, D. Zent. Afr. Exp., I (1), p. 28, 1912.	Ijolite.	

SUBRANG 5. PERSODIC. IJOLOSE. (C. I. P. W., 1902.)

1	''III.9.1.(4)5. 2.1.3.3.2.	lc 8.72 ac 5.08 ne 46.29 ns 0.37 cc 1.40 di 27.04 ol 1.38 cs 0.34 il 1.98 ap 5.71	Iivaara, Kuosamo, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., No. 11, p. 17, 1900.	Ijolite.	In W. T., p. 353.
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SUBCLASS II. Q+F+L DOMINANT OVER C+Z.

ORDER 6. LENDOFELIC. ESKIMARE. (H. S. WASHINGTON, 1917.)

SUBRANG 4. DOSODIC. KAKORTOKOSE. (H. S. WASHINGTON, 1917.)

1	III.(1)II.6(7).1.4. 1.1.2.5.3.	or 15.57 ac 12.47 ab 12.58 ns 8.54 ne 14.20 di 22.57 hl 1.64 ol 2.45 Z 7.32 il 0.91	Kringlerne, Kangerdluarsuk, Ilmausak District, Greenland.	C. Christensen.	N. V. Ussing, G. Julbb., p. 182, 1911.	Kakortokite (eudialyte lujavrite).	Red sheet.
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ORDER 1. PERPOLIC. HUNGARARE. (C. I. P. W., 1902.) SECTION 1. PERPYRIC. MINNESOTIARE. (C. I. P. W., 1902)

SUBRANG 1. PERMAGNESIC.

1	IV(V).1''.1.1''.1''.	Q 5.22 di 11.98 or 2.22 hy 67.26 ab 5.24 mt 5.80 an 0.83	Coyote, Santa Clara County, California.	H. E. Kramm.	H. E. Kramm, Fr. Am. Ph. Soc., XLIX, p. 334, 1910.	Enstatite pyroxenite.	
2	IV(V).1.1(2).1. 1(2).	or 1.11 di 6.15 ab 7.34 hy 69.10 an 6.67 ol 8.13 mt 0.70 il 0.30	Norseman, Western Australia.	E. S. Simpson.	W. D. Campell, W. Aust. G. S. B. 21, p. 119, 1906.	Hypersthen- ite.	

SUBRANG 2. DOMAGNESIC. COOKOSE. (C. I. P. W., 1902.)

1	IV.1.1.1.2.⊙	or 1.11 hy 69.66 ab 6.81 ol 1.31 an 15.01 mt 2.09 il 1.52 ap 0.67	New Braintree, Massachusetts.	L. G. Eakins.	B. K. Emerson, U. S. G. S. B. 148, p. 77, 1897.	Wehrlite.	In W. T., p. 355.
2	IV.1.1.1.2.⊙	or 1.67 hy 72.78 ab 7.34 ol 0.62 an 10.29 mt 3.71 C 1.83 il 0.76 cm 0.22	Buckbee Mine, n. Peekskill, New York.	G. S. Rogers.	G. S. Rogers. Ann. N. Y. Ac. Sci., XXI, p. 65, 1911.	Norite.	

CLASS IV. DOFEMANE—Continued.

RANG 1. PERMIRIC. MINNESOTASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3	46.96	14.13	0.76	14.95	15.97	2.32	0.35	1.68	1.26	0.07	0.62	0.03	0.93	Cr ₂ O ₃ trace NiO 0.06	100.09	3.193
A2. II	.783	.138	.005	.208	.399	.041	.006	.018			.008	—	.013			
4	51.83	7.98	1.48	8.28	24.10	5.26	0.35	0.06	0.29		0.29	0.09	trace	Cr ₂ O ₃ 0.31 NiO 0.11	100.43	
A2. II	.864	.078	.009	.115	.603	.094	.006	.001			.004	—	—			
5	52.75	10.29	0.35	11.92	15.61	4.21	1.66	0.81	0.92		1.19	0.40	0.46		100.57	
A2. II	.879	.101	.002	.165	.390	.075	.027	.009			.015	.003	.007			
6	51.55	4.45	0.50	14.50	22.08	2.61	0.64	0.56	1.28		0.58	0.11	0.50		99.36	
A2. II	.859	.044	.003	.201	.552	.046	.010	.006			.007	.001	.007			
7	50.81	8.86	3.17	8.90	16.49	4.40	1.18	0.99	0.95			0.51	0.46	FeS ₂ 3.88	100.60	
A2. II	.847	.087	.020	.124	.412	.079	.019	.011				.004	.007		(100.14)	
8	50.40	6.01	1.12	9.00	17.74	5.00	0.26	3.44	2.95	0.11	0.93	0.06	0.10	CO ₂ none SO ₃ 0.11 Cr ₂ O ₃ 2.44	99.67	
A2. II	.840	.059	.007	.125	.444	.089	.004	.036			.012	—	.001			

RANG 2. DOMIRIC.

1	50.08	6.56	1.56	8.94	12.95	16.14	0.89	0.46	0.32	0.19	1.90	0.19	0.40	S 0.37	100.95	
A2. II	.835	.064	.010	.124	.324	.288	.014	.005			.024	.001	.006			
2	48.04	7.82	2.01	9.32	13.33	13.01	0.69	0.48	2.90	0.17	1.16	trace	none	CO ₂ none SO ₃ 0.23 S 0.90 BaO none	100.06	
A2. II	.801	.077	.013	.129	.333	.232	.011	.005			.015	—	—			
3	51.87	17.56	0.83	7.20	6.82	10.65	2.11	0.87	0.60		0.82	0.62	trace		99.95	
A2. II	.865	.172	.005	.100	.171	.190	.034	.009			.010	.004	—			
4	50.25	5.15	1.01	7.45	15.72	16.75	0.23	trace	2.50		0.23		0.30		99.59	3.10
A2. II	.838	.050	.006	.104	.393	.299	.004	—			.003		.004			
5	48.93	8.79	3.35	7.33	16.12	13.46	0.48	0.20	0.79	0.14	0.59	0.11			100.29	
A2. II	.816	.086	.021	.102	.403	.240	.008	.002			.007	.001				
6	47.74	5.03	5.24	10.58	19.42	11.12	0.21	none	0.10	0.22	0.25	0.08		S 0.21 Cu 0.06	100.22	
A2. II	.796	.049	.033	.147	.486	.198	.003	—			.003	—				
7	51.87	5.28	2.29	7.37	22.52	8.71	0.47	0.31	0.97	0.17	trace	trace	0.10	Cr ₂ O ₃ 0.21 NiO 0.21 CuO 0.06	100.54	3.222
A1. I	.865	.052	.014	.103	.563	.155	.008	.003			—	—	.001			
8	48.72	11.75	1.44	6.63	10.92	16.45	0.96	0.10	1.28	0.06	1.04	0.30	0.45	CO ₂ none ZrO ₂ none FeS ₂ 0.24 Cr ₂ O ₃ none V ₂ O ₅ 0.06 BaO none	100.40	3.12
A1. I	.812	.115	.009	.092	.273	.294	.016	.001			.013	.002	.006			

ORDER 1. PERPOLIC. HUNGARARE. SECTION 1. PERPYRIC. MINNESOTIARE—Continued.

SUBBRANG 2. DOMAGNESIC. COOKOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	IV.1.1(2).1.2(3).	or 10.01 hy 59.30 ab 3.14 ol 7.99 an 11.40 mt 1.16 C 7.45 il 1.06	Gunflint Lake, Cook County, Minnesota.	H. N. Stokes.	W. S. Bayley, J. G., III, p. 10, 1895.	Hypersthene gabbro.	In W. T., p. 355.
4	IV.1.1(2).1.2.	or 0.56 di 5.10 ab 3.14 hy 60.48 an 19.74 ol 8.70 mt 2.09 il 0.61	Meadow and Granite creeks, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 658, 1895.	Hornblende pyroxenite (bahiite).	In W. T., p. 355
5	(III)IV.1.1.1.2.	or 5.00 hy 56.87 ab 14.15 ol 1.87 an 18.07 mt 0.46 il 2.28 ap 1.01	Romsaas, Norway.	C. Bugge.	C. Bugge, Fh. Vid. Selsk. Christ. (1906), No. 8, p. 18, 1907.	Kugel norite.	Whole rock.
6	IV.1.1(2).1.2.	or 3.34 di 3.37 ab 5.24 hy 67.15 an 7.78 ol 9.08 mt 0.70 il 1.06 ap 0.34	Romsaas, Norway.	C. Bugge.	C. Bugge, Fh. Vid. Selsk., Christ. (1906), No. 8, p. 18, 1907.	Kugeln in norite.	
7	IV.1.1.1.2.	Q 0.60 di 2.00 or 6.12 hy 54.89 ab 9.96 mt 4.64 an 15.85 ap 1.34 pr 3.88	Romsaas, Norway.	C. Bugge.	C. Bugge, Fh. Vid. Selsk. Christ. (1906), No. 8, p. 18, 1907.	Norite.	
8	IV.1(2).1(2).1(2).2.	or 20.02 di 15.50 ab 2.10 hy 39.98 an 5.28 ol 6.47 mt 1.62 il 1.82 cm 3.88	Mawheraiti, Reefion District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Mica dike rock.	Derived from No. 9, IV.1.1.2.2, by pressure.

SUBBRANG 2. DOMAGNESIC.

1	IV.1.1.1.2(3).2.	or 2.78 di 53.60 ab 7.34 hy 13.10 an 12.51 ol 4.48 mt 2.32 il 3.65 ap 0.34	Near James River Gap, Virginia.	W. M. Thorn- ton.	T. L. Watson, pers. com.	Gabbro.	
2	IV.1(2).1.2.2.	or 2.78 di 38.06 ab 5.76 hy 24.84 an 16.96 ol 1.25 mt 3.02 il 2.28 pr 1.46	Coulterville, Mariposa County, California.	G. Steiger.	H. W. Turner, J. G., IX, p. 508, 1901.	Amphibole- pyroxene rock.	
3	(III)IV.1(2).1. 2.2.	Q 2.70 di 10.88 or 5.90 hy 23.01 ab 17.82 mt 1.16 an 35.86 ol 1.52 ap 1.34	Romsaas, Norway.	C. Bugge.	C. Bugge, Fh. Vid. Selsk. Christ. (1906), No. 8, p. 18, 1907.	Norite.	
4	IV.1.1.2.2.	ab 2.10 di 56.28 an 12.79 hy 20.55 ol 3.51 mt 1.39 il 0.46	Bauerberg, Neurode, Silesia.	O. Hauser.	F. Tannhäuser. Sb. Pr. Ak. W., 1908, II, p. 1071.	Pyroxenite.	
5	IV.1.1.1.2.2.	or 1.11 di 35.58 ab 4.19 hy 26.02 an 21.13 ol 5.11 mt 4.87 il 1.06 ap 0.34	Tongafeno, Madagascar.	Not stated.	A. Lacroix, pers. com.	Pyroxenite.	
6	IV(V).1(2).1(2). 2.2.	ab 1.57 di 33.73 an 12.79 hy 33.79 ol 9.59 mt 7.06 il 0.46	Inisizwa, Mount Ayliff, East Griqualand.	W. Versfeld.	A. L. Dutoit, A. R. G. Com. Cape G. H., XV, p. 126, 1910.	Olivine gabbro.	
7	IV.1.1.1.2. (1)2.	or 1.67 di 25.13 ab 4.19 hy 45.85 an 11.40 ol 7.42 mt 3.25	Dolodrook River, Mount Wellin- gton, North Gipps- land, Victoria.	Ampt.	E. O. Thiele, Pr. R. Soc. Vict., XXI (1), p. 257, 1908.	Pyroxenite.	
8	(III)IV.1.1.1. 2(3).2.	or 0.56 di 42.13 ab 8.38 hy 11.97 an 27.24 ol 3.71 mt 2.09 il 1.98 ap 0.67	Boulder, Kalgoor- lie, Western Australia.	H. Bowley.	Simpson and Gibson, W. Aust. G. S. B. 42, p. 61, 1912.	Gabbro.	

CLASS IV. DOFEMANE—Continued.

RANG 2. DOMIRIC—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9	52.10	4.41	3.20	6.84	17.75	8.94	0.84	0.44	1.67	0.08	0.89	0.09	0.20	CO ₂ none FeS ₂ 0.60 Cr ₂ O ₃ 2.00	100.05	
A2. II	.868	.043	.020	.095	.444	.160	.014	.005			.011	—	.003			

RANG 3. CALCIMIRIC.

1	48.11	5.40	0.54	23.01	2.27	17.80	1.49	0.83	0.45			0.26	trace	S 0.08	100.24	
A3. III	.802	.053	.003	.320	.057	.318	.024	.009				.002	—			

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. HILASE. (R. A. DALY, 1911.)

1	49.62	10.51	0.64	12.02	15.98	7.86	1.40	0.55	0.49	0.38	1.01	0.16	0.09		100.71	3.118
A2. II	.827	.103	.004	.167	.400	.140	.023	.006			.013	.001	.001			
2	49.02	10.14	1.54	10.46	17.25	8.29	1.59	0.40	0.59	0.16	0.99	0.11	0.16		100.70	3.152
A2. II	.817	.090	.009	.145	.431	.148	.026	.004			.012	.001	.002			
3	51.23	6.17	1.96	6.95	26.52	4.03	0.29	0.12	0.14	0.10	0.27	none	1.46	S 0.41 Cr ₂ O ₃ 0.31 BaO none CuO 0.21	100.17	
A1. I	.854	.060	.012	.097	.663	.071	.005	.001			.003	—	.021			
4	51.76	6.05	1.64	8.01	27.14	3.12	0.79	0.32	0.82			0.07		S 0.17	99.89	3.221
A3. III	.863	.059	.010	.111	.679	.055	.013	.003				—				
5	47.44	5.36	3.13	12.42	19.96	7.60	0.48	0.10	0.08		1.29	0.27	0.15	ZrO ₂ none S 0.34 Cr ₂ O ₃ 0.07 BaO none	100.69	
A1. I	.791	.053	.019	.172	.499	.136	.008	.001			.016	.002	.002			
6	48.57	10.51	2.19	9.45	17.53	8.06	1.59	0.34	0.37	0.10	1.48	0.19	0.16	CO ₂ none Cr ₂ O ₃ 0.10 NiO 0.08	100.72	3.065
A1. I	.809	.103	.014	.131	.438	.144	.026	.004			.019	.001	.002			

RANG 2. DOMIRIC. BRUNASE. (J. A. DRESSER, 1909.)

1	48.63	5.32	2.91	3.90	21.79	13.04	0.34	0.23	2.81		0.47	0.21	0.12	CO ₂ trace Cr ₂ O ₃ 0.36 BaO trace	100.13	
A2. II	.811	.052	.018	.054	.545	.233	.005	.002			.006	.001	.002			
2	51.51	8.56	2.83	4.75	15.56	11.58	1.99	1.12	0.79	0.04	0.43	0.60		CO ₂ 0.01 SO ₃ 0.26	100.03	
A2. II	.859	.084	.018	.066	.389	.207	.032	.012			.005	.004				

RANG 2. DOMIRIC. BRUNASE.

1	45.37	6.21	2.40	8.09	18.67	14.47	0.85	0.37	0.88		1.50		0.15	CO ₂ 0.62 NiO 0.17	99.75	
A2. II	.756	.061	.015	.113	.467	.250	.014	.004			.019		.002			

ORDER 1. PERPOLIC. HUNGARARÉ. SECTION 1. PERPYRIC. MINNESOTIARE—Continued.

SUBRANG 2. DOMAGNESIC—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	IV.1(2).1.2."2.	Q 4.32 di 29.86 or 2.78 hy 37.45 ab 7.34 mt 4.64 an 6.67 il 1.67 cm 2.95	Mawheraiti, Reefton District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Hornblende dike rock.	Cf. No. 8, IV.1.1.1.2.

SUBRANG 4. DOFERROUS.

1	IV.1.1(2).3.4".	or 5.00 di 70.76 ab 4.72 ol 8.05 an 5.56 mt 0.70 ne 4.26 ap 0.67	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien, LIX, p. 214, 1909.	Pyroxenite.	
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ORDER 1. PERPOLIC. HUNGARARÉ. SECTION 2. DOPYRIC. QUEBECIARE. (J. A. DRESSER, 1909.)

SUBRANG 2. DOMAGNESIC. HILOSE. (R. A. DALY, 1911.)

1	(III)IV.1.2.1(2). 2.	or 3.34 di 14.15 ab 12.05 hy 29.37 an 20.57 ol 17.38 mt 0.93 il 1.98 ap 0.34	Weehawken, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 121, 1908.	Olivine diabase.	
2	(III)IV.1"2"1 (2).2.	or 2.22 di 16.96 ab 13.62 hy 22.87 an 19.13 ol 20.08 mt 2.09 il 1.82 ap 0.34	Englewood, New Jersey.	R. B. Gage.	J. V. Lewis, N. J. G. S. A. R. (1907), p. 121, 1908.	Olivine diabase.	Also in A. J. S., XXX, p. 158, 1908.
3	IV"1.(1)2.1.(1)2.	or 0.58 di 3.73 ab 2.62 hy 62.89 an 15.01 ol 10.86 mt 2.78 il 0.46	Near Maracas, Bahia, Brazil.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVIII, p. 85, 1914.	Bahiaite (horn- blende hypers- thenite).	Border. Cf. No. 5, IV.1.3.2.2.
4	IV.1.2.1.(1)2.	or 1.67 di 2.62 ab 6.81 hy 57.90 an 11.95 ol 15.74 mt 2.32	Radau, Harz.	Eyme.	O. H. Erdmanns- doerfer, Jb. Pr. G. L.-A., XXV, p. 471, 1907.	Bronzite rock.	
5	IV"1"2"2.1.2.	or 0.56 di 18.97 ab 4.19 hy 42.35 an 12.23 ol 13.07 mt 4.41 il 2.43 ap 0.67	Pammal Hill, Pallavaram, n. Madras, India.	H. S. Washing- ton.	H. S. Washington, A. J. S., XLI, p. 332, 1916.	Bahiaite (horn- blende hypers- thenite).	
6	(III)IV.1(2).2". 1(2).2.	or 2.22 di 15.11 ab 13.62 hy 23.74 an 20.29 ol 18.66 mt 3.25 il 2.89 ap 0.34	Flow of 1852, Mauna Loa, Hawaii, Hawaiian Islands.	G. Steiger.	R. A. Daly, J. G., XIX, p. 296, 1911.	Olivine basalt.	

SUBRANG 1. PERMAGNETIC. BELCHEROSE. (C. I. P. W., 1902.)

1	IV.1"(1)2.2.1".	or 1.11 di 40.25 ab 2.62 hy 23.18 an 12.51 ol 11.63 mt 4.18 il 0.91 cm 0.45 ap 0.34	Belchertown, Massachusetts.	L. G. Eakins.	B. K. Emerson, U. S. G. S. Mon. 29, p. 347, 1898.	Cortlandtite.	In W. T., p. 355.
2	(III)IV.1(2)."2. 2.1(2).	or 6.67 di 33.71 ab 16.77 hy 14.02 an 11.12 ol 10.42 mt 4.18 il 0.76 ap 1.34	Eberstadt, Hesse.	G. Butzbach.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 29, 1912.	Hornblende gabbro.	

SUBRANG 2. DOMAGNETIC. PALISADOSE. (J. V. LEWIS, 1907.)

1	IV.1"2(3).2.2.	or 2.22 di 47.68 ab 2.62 ol 25.01 an 11.95 mt 3.48 ne 2.56 il 2.89	St. Bruno Mountain, Montergan Hills, Quebec.	M. F. Connor.	J. A. Dresser, A. J. S., XXXVIII, p. 72, 1909.	Olivine pyroxenite.	Also in Can. G. S. Mem. 7, p. 17, 1910.
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CLASS IV. DOFEMANE—Continued.

RANG 2. DOMIRIC. BRUNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
2	45.44	5.85	2.84	6.49	16.24	18.16	1.03	0.38	1.15	0.10	1.50		0.24		99.42	3.35
A2. II	.757	.057	.018	.090	.406	.324	.017	.004			.019		.003			
3	50.28	3.94	0.30	9.03	17.40	14.86	1.31	0.26	n. d.		0.49		0.31	FeS ₂ 1.38 Cr ₂ O ₃ 0.25 V ₂ O ₅ 0.04 NiO 0.15	100.00	
A1. I	.838	.039	.002	.125	.435	.265	.021	.003			.006		.004			
4	47.87	6.09	1.40	8.14	16.33	14.49	0.87	0.55	1.07	0.26	1.20	0.07	0.20	CO ₂ 0.75 FeS ₂ 0.51 Cr ₂ O ₃ 0.25 V ₂ O ₅ trace NiO 0.04 BaO none SrO none	100.16	
A1. I	.798	.060	.009	.113	.408	.259	.015	.006			.015	.001	.003			
5	49.95	6.52	1.50	10.41	17.02	11.77	0.98	0.52	0.65	0.16	0.15	none		CO ₂ 0.25 Cl none S 0.11 Cr ₂ O ₃ 0.10	100.09	
A2. II	.833	.064	.009	.144	.426	.211	.016	.005			.002	—				
6	49.73	4.01	0.70	6.66	20.06	16.71	0.63	0.31	0.39	0.07	0.64	0.02	0.19	CO ₂ 0.26 S 0.35 Cr ₂ O ₃ trace CuO trace	100.73	
A2. II	.829	.039	.004	.093	.502	.298	.010	.003			.008	—	.003			
7	48.91	8.81	1.04	9.52	15.19	14.69	0.64	0.10	0.52	0.07	0.37	trace	0.16	Cr ₂ O ₃ 0.15 Li ₂ O trace	100.17	
A2. II	.815	.086	.007	.133	.380	.262	.010	.001			.005	—	.002			
8	46.06	10.01	3.17	5.61	14.74	10.55	1.31	5.14	1.44		0.73	0.21	trace	SO ₃ 0.05 Cl 0.03 BaO 0.32 SrO 0.20	99.57	
A1. I	.768	.098	.020	.078	.369	.188	.021	.055			.009	.001	—			
9	42.83	10.92	4.33	8.82	14.02	13.20	3.24	0.64	1.80		0.05	0.39	0.12	CO ₂ none S trace	100.36	
A2. II	.714	.107	.027	.122	.351	.235	.052	.007			—	.003	.002			
10	51.64	8.67	2.81	4.73	15.60	11.48	2.01	1.12	0.79	0.04	0.43	0.60		CO ₂ 0.01 SO ₃ 0.26	100.19	
A2. II	.861	.085	.018	.065	.390	.205	.032	.012			.005	.004				
11	45.09	10.81	5.83	7.94	13.47	15.21	1.39	0.16	0.46				trace		100.36	
A3. III	.752	.106	.036	.110	.337	.271	.023	.002					—			
12	44.97	5.19	2.94	8.80	17.50	19.09	0.47	0.05	0.40		0.55		0.05		100.01	
A2. II	.750	.051	.018	.122	.438	.341	.008	—			.007		—			
13	48.84	8.30	3.02	5.55	13.69	15.08	2.60	1.08	1.06		1.05	0.25	0.34		100.86	
A2. II	.814	.081	.019	.077	.342	.270	.042	.012			.013	.002	.005			
14	48.40	8.66	0.95	10.12	14.59	14.69	0.54	0.14	0.31	0.13	1.60	0.07			100.20	
A2. II	.807	.085	.006	.140	.365	.263	.009	.001			.020	—				
15	49.78	5.35	3.65	8.88	17.89	11.98	0.90	0.17	1.10		0.58	0.02	0.18		100.48	
A2. II	.830	.052	.023	.124	.447	.214	.015	.002			.007	—	.003			
16	45.43	11.49	3.58	7.10	12.02	15.50	2.16	0.82	0.83		0.91	0.42			100.26	
A2. II	.757	.113	.023	.099	.301	.277	.035	.009			.011	.003			(100.19)	

ORDER 1. PERPOLIC. HUNGARARE. SECTION 2. DOPYRIC. QUEBECIARE—Continued.

SUBRANG 2. DOMAGN ESIC. PALISADOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
2	"IV.1".2.2(3)."/2.	an 10.01 di 57.18 lc 1.74 ol 14.91 ne 4.83 cs 2.41 mt 4.18 il 2.89	Rougemont Mountain, Rouville County, Quebec.	M. F. Connor.	J. J. O'Neil, Can. G. S. Mem. 43, p. 67, 1914.	Olivine yamaskite (jacupirangite).	
3	IV".1.2.2.2.	or 1.67 di 55.76 ab 11.00 hy 5.55 an 4.17 ol 19.54 mt 0.46 il 0.91	South Freeport, Maine.	J. E. Whitfield.	G. P. Merrill, pers. com.	Pyroxenite.	
4	IV.1".2.2.2.	or 3.34 di 48.15 ab 7.86 hy 3.92 an 10.84 ol 18.66 mt 2.09 il 2.28 ap 0.34	Prospect Hill, Litchfield, Connecticut.	W. F. Hillebrand.	W. H. Hobbs, Rosenb. Fests., p. 40, 1906.	Cortlandtite.	
5	IV.1.2.2.2.⊙	or 2.78 di 37.57 ab 8.35 hy 19.28 an 11.95 ol 16.44 mt 2.09 il 0.30	Montrose Point, n. Peekskill, New York.	G. S. Rogers.	G. S. Rogers, Ann. N. Y. Ac. Sci., XXI, p. 62, 1911.	Pyroxenite.	
6	IV(V).1.2.2"/2.	or 1.67 di 59.97 ab 5.24 ol 23.04 an 7.23 mt 0.93 il 1.22	Dickerson Hill, n. Peekskill, New York.	G. S. Rogers.	G. S. Rogers, Ann. N. Y. Ac. Sci., XXI, p. 62, 1911.	Olivine pyroxenite.	
7	IV.1.2.2.2.⊙	or 0.56 di 41.86 ab 5.24 hy 15.52 an 20.85 ol 13.38 mt 1.62 il 0.76	Orange Grove, Baltimore County, Maryland.	W. F. Hillebrand.	G. H. Williams, U. S. G. S. A. R. 15, p. 674, 1895.	Olivine gabbro.	In W. T., p. 355.
8	(III)IV.1(2).2"/2.	or 0.56 di 36.71 an 6.12 ol 18.50 lc 23.54 mt 4.64 ne 5.96 il 1.37 ap 0.34	Shonkin Creek, Highwood Mountains, Montana.	E. B. Hurlbut.	Weed and Pirsson, A. J. S., II, p. 321, 1896.	Missourite.	Also in L. V. Pirsson, U. S. G. S. B. 237, p. 117, 1905. In W. T., p. 355.
9	"IV.1(2).2(3).2.2.	an 13.34 di 38.55 lc 3.05 ol 21.17 ne 14.77 cs 0.34 mt 6.26 ap 1.01	Grenada, West Indies.	J. B. Harrison.	J. B. Harrison, Rocks of Grenada, p. 10, 1896.	"Olivine basalt."	In W. T., p. 355.
10	(III)IV.1"/2. 2.(1)2.	or 6.67 di 53.07 ab 16.77 hy 14.98 an 11.40 ol 10.07 mt 4.18 il 0.76 ap 1.34	Mühlthal, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 11, 1906.	Hornblende gabbro.	Center.
11	"IV.1(2).2.2.2.	or 1.11 di 42.13 ab 5.24 ol 16.75 an 22.52 mt 8.35 ne 3.69	Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Ural Nord, II, p. 440, 1905.	Tilaite.	
12	IV(V).1.2(3).2 (3).2.	an 11.95 di 51.45 ne 2.27 ol 22.97 cs 5.98 mt 4.18 il 1.06	Sinitzina Gora, Tagil, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 351, 1910.	Koswite.	
13	IV.1(2)."/2.2(3).2.	or 6.67 di 51.94 ab 7.07 ol 11.56 an 7.51 mt 4.41 ne 8.09 il 1.98 ap 0.67	Gher, Molibso, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 84, 1909.	Hornblendite.	
14	IV.1"/2.2.2.	or 0.56 di 42.05 ab 4.72 hy 16.25 an 20.85 ol 10.86 mt 1.39 il 3.04	Mount Antkitsika, Madagascar.	Not stated.	A. Lacroix, pers. com.	Diallagite.	
15	IV.1"/(1)2.2.2.	or 1.11 di 39.72 ab 7.86 hy 24.88 an 9.73 ol 9.77 mt 5.34 il 1.06	Thio, New Caledonia.	Boiteau.	A. Lacroix, C. R., CLII, p. 820, 1911.	Diallagite.	
16	(III)IV.1(2).2. 2"/2.	or 5.00 di 43.89 ab 2.10 ol 12.72 an 19.18 mt 5.34 ne 8.80 il 1.67 ap 1.01	Possession Island, Crozet Islands.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (4), p. 332, 1908.	Basalt.	

CLASS IV. DOFEMANE—Continued.

RANG 3. CALCIMIRIC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	43.90	11.26	2.36	8.78	6.26	24.90	0.98	0.24	0.66	0.10	0.59	0.14			100.17	
A2. II	.732	.110	.015	.122	.157	.445	.016	.003			.007	.001				

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. WEHRLASE. (C. I. P. W., 1902.)

1	48.95	5.69	1.20	12.11	23.49	5.33	1.58	0.79	0.18		0.81	0.12	0.08	Cr ₂ O ₃ 0.05 NiO 0.16 BaO trace	100.54	3.37
A1. I	.816	.056	.007	.168	.587	.094	.026	.008			.010	.001	.001			
2	46.13	4.69	0.73	16.87	25.17	4.41	0.08	trace	1.38		0.73	0.07	trace	S 0.24 Cr ₂ O ₃ 0.04 NiO 0.09 BaO trace	100.63	3.35
A1. I	.769	.046	.004	.234	.629	.078	.001	—			.009	—	—			
3	46.23	6.30	4.30	7.07	25.13	6.08	1.08	0.33	3.78				0.33		100.63	3.04
A3. III	.771	.062	.027	.099	.628	.109	.018	.004					.005			
4	47.25	9.07	1.45	10.41	19.96	7.88	1.38	0.35	0.04	0.08	1.61	0.21	0.13	CO ₂ none ZrO ₂ none Cr ₂ O ₃ 0.12 NiO 0.09 BaO none SrO none	100.03	
A1. I	.788	.089	.009	.144	.499	.141	.022	.004			.020	.001	.002			
5	46.59	7.69	2.20	10.46	21.79	7.41	1.33	0.28	0.37	0.04	1.83	0.11	0.18	ZrO ₂ none SO ₂ none Cr ₂ O ₃ 0.13 NiO 0.12 BaO none SrO none	100.53	3.001
A1. I	.777	.076	.014	.145	.545	.132	.021	.003			.023	.001	.002			

RANG 2. DOMIRIC. ROSSWEINASE. (C. I. P. W., 1902.)

1	42.76	5.71	3.16	3.30	27.11	10.03	2.24	0.49	4.85		0.17			Cr ₂ O ₃ 0.22	100.04	
A2. II	.713	.056	.020	.046	.678	.179	.036	.005			.002					
2	43.17	5.79	6.82	4.90	23.15	8.53	1.20	0.96	5.12		0.38		0.15		100.17	
A2. II	.720	.057	.043	.068	.579	.152	.019	.010			.005		.002			
3	47.35	5.68	4.03	3.06	17.92	8.98	3.41	2.61	3.80		1.45	1.96	0.08	CO ₂ 0.04	100.37	
A2. II	.789	.056	.025	.043	.448	.161	.055	.028			.018	.014	.001			

RANG 2. DOMIRIC. ROSSWEINASE.

1	44.99	5.91	3.42	8.30	21.02	8.79	0.91	0.74	0.19	0.63	0.97	0.05	trace	CO ₂ trace Cr ₂ O ₃ 0.25 NiO none	99.17	
A2. II	.750	.058	.021	.115	.526	.157	.014	.008			.012	—	—			
2	45.17	10.02	3.55	5.03	19.84	8.57	3.11	1.61	1.58	0.69	0.54	0.28	0.13	CO ₂ none S 0.06 Cr ₂ O ₃ 0.11 BaO 0.07 SrO 0.06	100.42	
A1. I	.753	.098	.022	.069	.496	.154	.050	.017			.007	.002	.002			

ORDER 1. PERPOLIC. HUNGARARE. SECTION 2. DOPYRIC. QUEBECIARE—Continued.

SUBRANG 3. MAGNESIFERROUS.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	"IV.1".2.3.3.	an 25.30 di 47.27 lc 1.31 ol 4.14 ne 4.54 cs 12.38 mt 3.48 il 1.06 ap 0.34	Sohasahi, Madagascar.	Not stated.	A. Lacroix, pers. com.	Olivine gabbro.	

ORDER 1. PERPOLIC. HUNGARARE. SECTION 3. PYROLIC. HUNGARIARE. (C. I. P. W., 1902.)

SUBRANG 2. DOMAGNESIC. WEHRLOSE. (C. I. P. W., 1902.)

1	IV.1.3.1".2.	or 4.45 di 15.35 ab 13.62 hy 20.05 an 6.12 ol 37.11 mt 1.62 il 1.52 ap 0.34	Near Red Bluff, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 652, 1895.	Wehrlite.	In W. T., p. 355.
2	IV(V).1.(2)3.1.2.	ab 0.52 di 7.42 an 12.51 hy 42.93 ol 33.03 mt 0.93 il 1.37	North Meadow Creek, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVI, p. 655, 1895.	Hornblende picrite.	In W. T., p. 355.
3	IV.1".3.1"(1).2.	or 2.22 di 15.12 ab 9.43 hy 21.30 an 11.12 ol 31.64 mt 6.26	Loch Assynt, Sutherland, Scotland.	G. Wilson.	J. J. H. Teall, G. S. U. K. Mem. N. W. High., p. 86, 1907.	Gabbro- picrite.	
4	"IV.1".3.1(2).2.	or 2.22 di 16.65 ab 11.53 hy 18.12 an 17.51 ol 28.17 mt 2.09 il 3.04 ap 0.34	Flow of 1840, Nanawale, Puna, Hawaii, Ha- waiian Islands.	G. Steiger.	W. Cross, U. S. G. S. P. P. 88, p. 44, 1915.	Basalt.	
5	IV.1(2).3.1(2).2.	or 1.67 di 17.05 ab 11.00 hy 18.23 an 14.46 ol 30.49 mt 3.25 il 3.50 cm 0.22 ap 0.34	Uwekahana, Kilauea, Hawaii, Hawaiian Islands.	G. Steiger.	R. A. Daly, J. G., XIX, p. 293, 1911.	Olivine gabbro.	

SUBRANG 1. PERMAGNESIC. JAMILLOSE. (H. S. WASHINGTON, 1917.)

1	"IV.1.3."2.1".	an 4.17 di 35.29 lc 2.18 ol 38.69 ne 10.22 cs 0.52 mt 4.64 il 0.30	Oakhill, n. San José, Santa Clara County, California.	H. E. Kramm.	H. E. Kramm, Pr. Am. Phil. Soc., XLIX, p. 334, 1910.	Pyroxenite peridotite.	
2	IV.1(2).3.2". 1(2).	or 5.56 di 26.94 ab 9.96 hy 0.70 an 7.78 ol 33.44 mt 9.98 il 0.76	Schriesheim, Odenwald.	M. Dittrich.	Salomon and Nowomejsky, Vh. Nh. Ver. Heid., VII, p. 648, 1904.	Schries- peimite (amphibole peridotite).	
3	IV.1."3.2.1".	or 15.57 di 24.94 ab 7.34 ac 13.55 ne 3.98 ns 0.24 ol 25.61 il 2.74 ap 4.70	Jumilla, Murcia, Spain.	M. Dittrich.	A. Osann, Rosenb. Fests., p. 305, 1906.	Jumillite.	

SUBRANG 2. DOMAGNESIC. ROSSWEINOSE. (C. I. P. W., 1902.)

1	IV.1(2)."3."2.2.	or 4.45 di 26.65 ab 7.34 hy 12.81 an 10.01 ol 26.88 mt 4.87 il 1.82 cm 0.44	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, J. G., VI, p. 386, 1898.	Peridotite.	Also in U. S. G. S. Mon. 36, p. 259, 1899. In W. T., p. 357.
2	(III)IV.1(2).3. "2.(1).2.	or 9.45 di 25.35 ab 6.03 ol 30.60 an 8.62 mt 5.10 ne 11.22 il 1.06 ap 0.67	Near Blackfoot, Fort Hill Reser- vation, Idaho.	W. C. Wheeler.	E. S. Larsen, J. Wash. Ac. Sci., V, p. 466, 1915.	Nephelite basalt.	

CLASS IV. DOFEMANE—Continued.

RANG 2. DOMIRIC. ROSSWEINASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3	50.44	8.18	1.06	6.29	17.63	11.55	2.98	0.50	0.92	0.07			0.21	Cr ₂ O ₃ 0.48	100.31	
A3. III	.841	.080	.007	.088	.441	.206	.048	.005					.003			
4	47.75	10.56	0.74	8.34	19.09	9.62	1.32	0.12	2.06	0.05	0.37	0.03	0.10	Cr ₂ O ₃ 0.24 NiO 0.07 BaO none SrO trace	100.46	
A1. I	.796	.104	.005	.115	.477	.171	.021	.001			.005	—	.001			
5	44.78	9.38	4.51	7.70	16.85	10.85	2.24	0.20	0.25	0.08	0.74	none	1.90	CO ₂ none ZrO ₂ none S 0.29 Cr ₂ O ₃ 0.24 NiO none BaO none SrO none CuO 0.16	100.07	
A1. I	.746	.092	.028	.107	.421	.194	.036	.002			.009	—	.027			
6	44.18	10.67	0.97	10.03	17.77	9.75	2.37	1.23	0.97	1.30	0.38			CO ₂ trace	99.83	3.05
A2. II	.736	.105	.006	.139	.444	.174	.039	.013		.016	.003					
7	48.29	10.00	2.93	5.46	17.22	11.80	2.78	0.45	1.95						100.88	
A3. III	.805	.098	.018	.076	.431	.210	.045	.005								
8	48.15	9.52	2.98	5.46	17.42	11.91	2.34	0.40	2.35						100.53	
A3. III	.803	.093	.019	.076	.436	.212	.038	.004								
9	42.65	12.08	1.77	6.93	15.55	14.18	2.67	0.52	1.65		2.00	0.27	0.28	CO ₂ 0.11 SO ₃ none Cl 0.02	100.68	
A2. II	.711	.118	.011	.096	.389	.254	.044	.006			.025	.002	.004			
10	40.90	10.47	3.43	9.99	14.61	12.63	3.22	1.11	0.68	0.49	0.70	0.92	0.42	CO ₂ 0.23 SO ₃ trace Cl 0.22	100.02	3.136
A2. II	.682	.103	.021	.139	.365	.225	.052	.012			.009	.006	.006			
11	45.40	8.99	2.86	7.00	19.81	7.38	1.51	3.92	1.54	0.08	1.43				99.92	3.00
A2. II	.757	.088	.018	.097	.495	.132	.024	.041			.018					
12	46.54	10.39	3.01	8.80	14.78	11.29	2.21	1.79	1.34		0.60		0.06		100.83	
A2. II	.776	.102	.019	.122	.370	.202	.035	.019			.008		.001			
13	43.56	8.18	2.40	11.15	18.49	10.34	1.65	0.90	1.77	0.15	0.92	0.40	0.19	CO ₂ 0.04 ZrO ₂ none Cl 0.11 F none S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.02 NiO none BaO none SrO none Li ₂ O none Cu trace	100.28	3.177
A1. I	.726	.080	.015	.155	.462	.185	.027	.010			.012	.003	.003			

RANG 2. DOMIRIC. ROSSWEINASE.

1	40.31	12.24	5.77	10.92	9.10	12.12	7.52	1.08	0.29		0.89	0.45	trace	CO ₂ trace Cl trace S trace	100.69	3.114
A2. II	.672	.120	.086	.151	.227	.216	.121	.012			.011	.003	—	Cr ₂ O ₃ trace		

ORDER 1. PERPOLIC. HUNGARARE. SECTION 3. PYROLIC. HUNGARIARE—Continued.

SUBRANG 2. DOMAGNESIC. ROSSWEINOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	IV.1.(2)3.2."2.	or 2.78 di 39.68 ab 17.29 ol 25.58 an 7.51 mt 1.62 ne 4.26 cm 0.67	Knoxville, California.	W. H. Melville.	G. F. Becker, U. S. G. S. Mon. 13, p. 101, 1888.	Pseudo- diorite (gabbro).	In W. T., p. 357.
4	(III)IV.1."3.(1) 2.2.	or 0.56 di 19.73 ab 11.00 ol 28.76 an 22.90 ol 28.09 mt 1.16 il 0.76	Cathay Hill, Mariposa County, California.	W. F. Hille- brand.	H. W. Turner, U. S. G. S. A. R. 17 (I), p. 694, 1896.	Diabase.	In W. T., p. 357.
5	IV.1(2).3.2.2.	or 1.11 di 31.04 ab 11.00 ol 28.76 an 15.01 mt 6.50 ne 4.26 il 1.37	Near Maracas, Bahia, Brazil.	H. S. Washing- ton.	H. S. Washington, A. J. S., XXXVIII, p. 81, 1914.	Hornblend- ite.	Center. Cf. No. 3, IV.1.2.1.2.
6	(III)IV.1."3". "2.2.	or 7.23 di 24.72 ab 3.67 ol 34.51 an 14.73 mt 1.39 ne 9.09 il 2.43 ap 1.01	Benbeoch, Kyle District, Ayrshire, Scotland.	M. Dittrich.	G. W. Tyrrell, G. Mag. (V), IX, p. 122, 1912.	Kylite (feld- spathic peridotite).	
7	(III)IV.1"(2)3. 2.(1)2.	or 2.78 di 35.60 ab 13.10 ol 24.14 an 13.34 mt 4.18 ne 5.68	Etzdorf, n. Rosswein, Saxony.	Sachsse and Becker.	Sachsse and Becker, Ref. N. J., II, p. 503, 1893.	Gabbro.	In W. T., p. 357.
8	(III)IV.1"3. 2.(1)2.	or 2.22 di 35.39 ab 14.67 ol 24.46 an 14.18 mt 4.41 ne 2.84	Etzdorf, n. Rosswein, Saxony.	Sachsse and Becker.	Sachsse and Becker, Ref. N. J., II, p. 503, 1893.	Gabbro.	In W. T., p. 357.
9	(III)IV.1(2).3. 2.2.	an 18.90 di 32.30 lc 2.62 ol 22.79 ne 12.50 cs 2.75 mt 2.55 il 3.80 ap 0.67	Paschkopole, n. Teplitz, Bohemia.	Not stated.	J. E. Hibschi, T. M. P. M., XXVII, p. 55, 1908.	Leucitic basalt.	
10	IV.1(2).3.2.2.	an 10.84 di 28.85 lc 5.23 ol 27.19 ne 14.77 cs 3.10 mt 4.87 il 1.37 ap 2.02	Schanzberg, Bohemia.	F. Hanusch.	J. E. Hibschi, T. M. P. M., XXIII, p. 342, 1904.	Nephelite basalt.	
11	(III)IV.1(2).3". "2."2.	or 15.85 di 23.92 an 6.39 ol 32.86 lc 5.45 mt 4.18 ne 6.82 il 2.74	Piz Tgietschen, Graubünden, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Concretion in syenite.	
12	(III)IV.1"3. 2.2.	or 10.56 di 34.28 ab 4.19 ol 23.89 an 13.34 mt 4.41 ne 7.67 il 1.22	Tschauch River, Tagil District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 358, 1910.	Olivine gabbro.	
13	IV.1"3.2.2.	or 5.56 di 29.41 ab 4.19 ol 35.57 an 11.95 mt 3.48 ne 5.40 il 1.82 ap 1.01	Mount Elaine, Clarence River, New South Wales.	W. A. Greig.	G. W. Card, pers. com.	Olivine basalt.	

SUBRANG 3. MAGNESIFERROUS.

1	(III)IV.1(2).3". 2(3)."3.	lc 5.23 ac 6.01 ne 30.67 di 18.40 ol 21.26 cs 10.75 mt 5.34 il 1.67 ap 1.01	Dreistelz, Rhöngebirge.	H. Lenk.	H. Lenk, Vh. Ph. Ges. Würz., XXI, p. (60), 1887.	Nephelite basalt.	In W. T., p. 357.
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CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. CORTLANDTASE. (C. I. P. W., 1902.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	41.12	3.52	3.31	4.18	37.23	2.96	0.48	0.43	5.82	0.22	trace			Cr ₂ O ₃ 0.82 NiO 0.26	100.35	2.96
A2. II	.685	.034	.021	.058	.931	.053	.008	.005			—					
2	40.45	2.51	5.32	4.43	36.49	2.99	0.97	0.36	6.11	0.42				Cr ₂ O ₃ 0.23	100.28	2.96
A3. III	.674	.025	.033	.061	.912	.054	.016	.004								

RANG 1. PERMIRIC. CORTLANDTASE.

1	46.03	9.27	2.72	9.94	25.04	3.53	1.48	0.87	0.64			0.17	0.40		100.09	
A2. II	.767	.091	.017	.139	.626	.062	.024	.009				.001	.006			
2	43.37	8.48	2.91	11.00	25.93	5.03	1.33	0.58	0.19		1.03	0.19	0.13	Cl S 0.08 trace	100.25	
A2. II	.723	.083	.018	.153	.648	.089	.021	.006			.013	.001	.002			
3	40.35	3.75	3.53	9.86	25.69	4.64	3.14	0.80	5.28	0.83	2.12	0.25	0.20	CO ₂ trace NiO trace BaO 0.06	100.50	
A2. II	.673	.037	.022	.137	.642	.083	.051	.009			.027	.002	.003			
4	39.43	4.47	2.70	23.38	22.46	3.52	0.36	0.30	1.42	0.08	1.22	0.20	0.52	ZrO ₂ 0.10 S 0.15 Cr ₂ O ₃ none NiO 0.22 CoO 0.07 BaO 0.19	100.79	
A1. I	.657	.044	.017	.325	.562	.063	.006	.003			.015	.001	.007			
5	44.10	9.59	3.11	10.36	20.51	8.21	1.52	0.62	n. d.		2.07	0.26			100.35	
A2. II	.735	.094	.019	.144	.513	.146	.024	.007			.026	.002				
6	43.96	9.84	3.04	10.40	20.70	7.93	1.48	0.62	0.01		2.07	0.25			100.30	
A2. II	.733	.096	.019	.144	.518	.141	.024	.006			.026	.002			(100.28)	
7	41.63	6.28	2.64	9.32	29.65	7.28	0.44	0.46	1.96		0.49	0.06			100.26	
A2. II	.695	.062	.016	.129	.741	.130	.007	.005			.006	—				

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. LHERZASE. (C. I. P. W., 1902.)

1	41.50	6.93	2.19	6.69	35.90	5.80	1.37	0.30	0.32				trace	Cr ₂ O ₃ trace	101.00	
B3. IV	.692	.068	.014	.093	.898	.103	.022	.003					—			

RANG 1. PERMIRIC. LHERZASE.

1	40.82	10.66	1.80	8.92	28.08	6.11	0.58	0.21	2.00	0.16	0.16		0.19	CO ₂ trace S 0.02 Cr ₂ O ₃ 0.25 NiO 0.11 CuO 0.05	100.12	
A1. I	.680	.105	.011	.124	.702	.109	.009	.002			.002		.003			
2	39.25	5.39	2.60	8.90	33.72	4.55	1.18	0.60	2.83		0.77				99.79	
A2. II	.654	.053	.016	.124	.843	.081	.019	.006			.010					

ORDER 1. PERPOLIC. HUNGARARE. SECTION 4. DOMOLIC.

SUBRANG 1. PERMAGNESIC. CORTLANDTOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	IV(V).1''4.1.1.	or 2.78 di 6.94 ab 4.19 hy 6.86 an 5.84 ol 61.64 mt 4.87 cm 1.12	Gigestaffel, n. Andermatt, Switzerland.	C. Schneider.	C. Schneider, In. Diss. Zur., p. 30, 1912.	Diallage peridotite.	
2	IV(V).1''4(5). 1.1''.	or 2.22 di 10.64 ab 8.38 ol 63.20 an 1.39 mt 7.66	Gigestellen, n. Andermatt, Switzerland.	C. Schneider.	C. Schneider, In. Diss. Zur., p. 30, 1912.	Diallage peridotite.	

SUBRANG 2. DOMAGNESIC. CUSTEROSE. (C. I. P. W., 1902.)

1	IV.1''4.1.2.	or 5.00 hy 16.03 ab 12.58 ol 45.40 an 16.12 mt 3.94 ap 0.34	Cottonwood Gulch, Silver Cliff, Custer County, Colorado.	L. G. Eakins.	W. Cross, Pr. Col. Sci. Soc., II, p. 245, 1887.	Peridotite.	Also in U. S. G. S. A. R. 17, (II), p. 284, 1896. In W. T., p. 357.
2	IV.1''4''1.2.	or 3.34 di 6.64 ab 11.00 hy 3.76 an 15.57 ol 53.07 mt 4.18 il 1.98 ap 0.34	Loberia Vieja, Masafuera, Juan Fernandez Islands.	N. Sahlbom.	P. D. Quensel, B. G. Inst. Ups., XI, p. 287, 1912.	Picrite- basalt.	
3	IV(V).1''4.1''2.	or 5.00 ac 10.16 ab 3.14 di 10.59 ne 6.25 ol 52.88 il 6.26 ap 0.67	Lugar, Ayrshire, Scotland.	A. Scott.	G. W. Tyrrell, pers. com.	Hornblende peridotite.	
4	IV(V).1''4.1.2(3).	or 1.67 di 3.40 ab 3.14 hy 17.36 an 9.73 ol 56.32 mt 3.94 il 2.28 ap 0.34	Västra Värnsingen, N. Ulfön, Nordingra, Sweden.	M. Wunder.	J. E. Sobral, G. Nord. Reg., p. 103, 1913.	Peridotite.	
5	IV.1(2).4''1. (2).2.	or 3.89 di 16.80 ab 12.58 hy 0.63 an 17.51 ol 39.85 mt 4.41 il 3.95 ap 0.67	Lava of 1903, Plaine des Osmondes, Reunion.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Olivine basalt.	
6	IV.1(2).4.1(2). 2.	or 3.34 di 15.04 ab 12.58 hy 2.23 an 18.35 ol 39.65 mt 4.41 il 3.95 ap 0.67	Piton des Niegas, Reunion.	Boiteau.	A. Lacroix, C. R., CLV, p. 539, 1912.	Feldspathic picrite.	
7	IV.1.4.1''2.	or 2.78 di 17.60 ab 1.05 ol 56.88 an 13.90 mt 3.71 ne 1.42 il 0.91	Riviere du Mat, Reunion.	Boiteau.	A. Lacroix, C. R., CLV, p. 539, 1912.	Harrisite, (feldspathic peridotite).	

ORDER 1. PERPOLIC. HUNGARARE. SECTION 5. PEROLIC. PYRENIARE.

SUBRANG 1. PERMAGNESIC. LHERZOSE. (C. I. P. W., 1902.)

1	IV.1''5.1.1.	an 11.95 di 7.01 lc 1.31 ol 68.58 ne 6.25 cs 2.41 mt 3.25	Causou, Pyrenees.	Brunet.	A. Lacroix, Ref. N. J., II, p. 267, 1895.	Hornblende lherzolite.	In W. T., p. 357.
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SUBRANG 2. DOMAGNESIC. ARGEINOSE. (C. I. P. W., 1902.)

1	IV.1.5.1.(1)2.	or 1.11 di 3.80 ab 4.19 ol 59.48 an 26.13 mt 2.55 ne 0.28 il 0.30 cm 0.45	Dornabac Bridge, n. Harris, Rum Island, Scotland.	W. Pollard.	A. Harker, Mem. G. S. Scot., G. Sm. Islds., p. 80, 1908.	Harrisite (feldspathic peridotite).	
2	IV''1''(4)5.1(1)2.	an 7.78 di 8.55 lc 2.62 ol 66.15 ne 5.40 cs 1.20 mt 3.71 il 1.52	Argein, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int. VIII, C. R., p. 833, 1901.	Hornblende peridotite.	In W. T., p. 357.

CLASS IV. DOFEMANE—Continued.

RANG 1. PERMIRIC. LHERZASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3	40.02	8.32	1.51	11.14	27.63	4.04	0.65	0.32	4.30	0.70	0.59		0.85	FeS ₂ 0.51 Cr ₂ O ₃ trace	100.58	2.99
A2. II	.687	.081	.009	.155	.691	.072	.010	.003			.008		.012			

RANG 3. CALCIMIRIC. VENANZASE. (C. I. P. W., 1902.)

1	41.43	9.80	3.28	5.15	13.40	16.62	1.64	7.40	1.11		0.29	none			100.12	2.758
A2. II	.691	.096	.021	.072	.335	.296	.026	.079			.004	—				

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC.

1	53.05	8.91	3.26	9.52	14.42	6.76	0.66	0.48	0.65		1.77	0.09	0.08		99.65	3.09
A2. II	.884	.087	.020	.133	.361	.121	.011	.005			.022	—	.001			

RANG 2. DOMIRIC. YAMASKASE. (G. A. YOUNG, 1904.)

1	39.97	8.68	8.63	7.99	10.32	15.18	1.19	0.74	0.57		4.05	0.10	0.19	CO ₂ 1.15 FeS ₂ 1.01	99.77	
A2. II	.666	.085	.085	.111	.258	.271	.019	.008			.051	.001	.003			

RANG 2. DOMIRIC. YAMASKASE.

1	40.2	9.5	9.7	12.2	8.0	13.1	0.8	0.2	0.5		4.7		0.4	FeS ₂ 0.4	99.7	3.36
B2. III	.670	.093	.060	.170	.200	.234	.013	.002			.059		.006			

RANG 3. CALCIMIRIC. BRANDBERGASE. (C. I. P. W., 1902.)

1	43.17	9.93	8.78	6.88	6.80	20.96	1.77	0.16	0.31		1.56				100.30	3.28
A3. III	.720	.097	.055	.096	.170	.374	.029	.002			.020					
2	37.35	7.33	11.23	7.33	7.90	21.93	0.96	0.95	n. d.		4.01	2.27			100.80	
A2. II	.623	.072	.070	.102	.198	.392	.016	.010			.050	.016				
3	45.05	6.50	3.83	7.69	12.07	18.82	0.94	0.78	2.40		2.65	0.15			100.88	
A2. II	.751	.064	.024	.107	.302	.336	.015	.009			.033	.001				
4	41.30	5.19	14.39	9.07	10.16	14.73	0.54	1.33	0.84		2.01	trace	0.20	CO ₂ 0.18	99.94	
A2. II	.688	.051	.090	.126	.254	.263	.009	.014			.025		.003			

RANG 3. CALCIMIRIC. BRANDBERGASE.

1	48.20	8.09	5.32	12.53	5.92	17.20	1.35	0.31	0.43	0.25	0.74	0.14		S 0.03	100.51	
A2. II	.803	.079	.033	.174	.148	.307	.022	.003			.009	.001				

ORDER 1. PERPOLIC. HUNGARARE. SECTION 5. PEROLIC. PYRENIARE—Continued.

SUBRANG 2. DOMAGNESIC. ARGEINOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	IV.1.(4)5.1."2.	or 1.67 di 0.89 ab 5.24 hy 5.90 an 18.90 ol 60.38 mt 2.09 il 1.22	Wommelshansau, n. Dillenburg, Hesse Nassau.	R. Brauns.	R. Brauns, N. J. B. B., XVIII. p. 292, 1904.	Picrite.	

SUBRANG 2. DOMAGNESIC. VENANZOSE. (C. I. P. W., 1902.)

1	(III)IV.1."5."3.2.	lc 26.16 ac 4.16 ne 4.83 ol 29.16 kp 6.00 cs 25.46 mt 2.78 il 0.61	Pian di Celle, n. San Venanzo, Umbria, Italy.	H. Rosenbusch.	H. Rosenbusch, Sb. Pr. Ak. W., 1899, p. 114.	Euktolite (venan- zite).	Cf. A. J. S., VII, p. 399, 1899. In W. T., p. 357.
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ORDER 2. DOPOLIC. SCOTARE (C. I. P. W., 1902.) SECTION 1. PERPYRIC.

SUBRANG 2. DOMAGNESIC.

1	(III)IV.(1)2.1. 1"2	Q 8.58 di 11.12 ab 2.10 ol 4.05 ab 5.76 cs 25.46 an 19.74 il 3.34	Eriyur, South Arcot, India.	P. Brühl.	T. H. Holland, Rec. G. S. Ind., XXX, p. 28, 1897.	Augite norite.	In W. T., p. 355.
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SUBRANG 2. DOMAGNESIC. YAMASKOSE. (G. A. YOUNG, 1904.)

1	IV.2.1"2(3).2.	or 4.45 di 45.58 ab 2.10 ol 4.05 an 16.12 mt 12.53 ne 4.26 il 7.75 ap 0.34 pr 1.01	Mount Yamaska, Quebec.	G. A. Young.	G. A. Young, Can. G. S. A. R. (1904), p. 33, 1906.	Yamaskite (horn- blende ja- cupirang- ite).	
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SUBRANG 3. MAGNESIFEROUS.

1	IV.2"1.2.3.	Q 0.66 di 34.79 or 1.11 hy 10.84 ab 6.81 mt 13.92 an 21.68 il 8.97	Druin an Eidhne, Skye, Scotland.	J. H. Player.	Geikie and Teall, Q. J. G. S., L, p. 653, 1894.	Gabbro.	Dark band. Of. No. 73, II.5.4.4.5. In W. T., p. 359.
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SUBRANG 2. DOMAGNESIC. BRANDBERGOSE. (C. I. P. W., 1902.)

1	IV.2.1.3"2(3).	or 1.11 di 41.93 ab 2.62 wo 13.57 an 18.35 mt 12.76 ne 6.82 il 3.04	Burnt Head, Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, Am. G., XXVI, p. 340, 1900.	Gabbro- pyroxenite.	In W. T., p. 359.
2	IV.2.1(2).3"2"2"2."	an 12.79 di 42.77 lc 4.36 wo 3.60 ne 4.54 cs 5.50 mt 12.06 il 7.60 nm 2.88 ap 5.38	Bad na Achlaise, n. Ledmore, Assynt, Scotland.	A. Gemmell.	A. Gemmell, Tr. Edin. G. Soc., IX (5), p. 417, 1910.	Cromaltite.	
3	IV.(1)2.1"1"3.2.	an 11.12 di 62.19 lc 3.92 ol 5.32 ne 4.26 cs 0.95 mt 5.57 il 5.02 ap 0.34	Brandberget, Gran, Norway.	L. Schmelck.	W. C. Brögger, Q. J. G. S., L, p. 31, 1894.	Pyroxenite.	In W. T., p. 359.
4	IV.2.1(2)3.2"2."	or 7.78 di 51.33 ab 4.72 hy 1.73 an 7.51 ol 1.03 mt 20.88 il 3.95	Malgola, Predazzo, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak. W., 1904, p. 67.	Pyroxenite.	

SUBRANG 3. MAGNESIFEROUS.

1	IV.(1)2.1.3.3.	Q 0.90 di 57.78 or 1.67 hy 3.45 ab 11.53 mt 7.66 an 15.01 il 1.37 ap 0.34	Insizwa, Mount Ayliff, East Griqualand.	W. Versfeld.	A. L. Du Toit, A. R. G. Com. Cape G. H., XV, p. 126, 1910.	Gabbro.	
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CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. VALBONNASE. (C. I. P. W., 1902.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	46.40	10.80	5.90	5.60	22.20	3.72	0.30	1.21	3.85						100.18	
A3. III	.773	.106	.036	.078	.555	.066	.005	.013								

RANG 1. PERMIRIC. VALBONNASE.

1	50.66	4.42	6.85	6.84	25.77	3.30	1.15	0.35	0.28	0.12	0.33	0.06		S trace	100.13	
A2. II	.844	.043	.043	.095	.644	.059	.019	.004			.004	—				

RANG 2. DOMIRIC. MONTREALASE. (H. S. WASHINGTON, 1917.)

1	44.66	9.64	4.98	6.65	12.83	13.11	2.07	1.17	0.79	0.11	2.27	0.24	0.19	CO ₂ 0.37 Cl 0.07 FeS ₂ 0.22 BaO none SrO 0.03	99.40	
A1. I	.744	.095	.031	.093	.321	.234	.034	.013			.028	.002	.003			
2	40.42	9.98	9.83	10.67	11.56	10.78	1.26	0.60	1.17	0.45	2.51	0.63	0.25	NiO 0.02 BaO 0.05 SrO 0.02 Li ₂ O trace	100.20	
A1. I	.674	.098	.061	.148	.289	.193	.020	.006			.081	.004	.004			
3	37.33	7.27	13.41	9.24	12.27	16.50	0.45	0.30	1.03	0.10	1.66		0.07		99.63	
A2. II	.622	.071	.084	.128	.307	.295	.007	.003			.021		.001			
4	44.47	7.59	6.25	9.57	11.93	10.24	4.27	1.46	0.73	0.48	2.73	0.54	0.49	CO ₂ trace	100.75	
A2. II	.742	.075	.039	.133	.298	.183	.069	.016			.034	.004	.007			
5	43.53	7.24	11.10	8.70	11.51	10.19	2.88	1.39	1.34	0.43	1.90	trace		CO ₂ none	100.21	
A2. II	.728	.071	.069	.121	.288	.182	.047	.015			.024	—				
6	38.20	9.16	6.12	5.89	14.69	9.93	3.44	2.20			7.27	trace		CO ₂ trace Cr ₂ O ₃ 3.01	99.91	2.914
A2. II	.637	.090	.038	.082	.347	.177	.055	.024			.091	—				
7	38.08	11.42	7.18	6.55	12.11	13.08	2.23	1.24	3.98		3.15	0.54		SO ₃ 0.10	99.73	3.071
A2. II	.635	.112	.045	.091	.303	.234	.037	.014			.039	.004				
8	42.06	12.18	2.67	7.89	11.47	11.29	5.10	1.07	3.08		1.93	0.34		X 0.88 S 0.09	100.05	2.968
A2. II	.701	.119	.017	.110	.287	.201	.082	.012			.024	.002				
9	39.47	11.26	8.74	4.98	14.33	12.08	5.04	1.86	0.63		1.56	0.99	trace		100.94	2.896
B2. III	.658	.110	.054	.070	.358	.216	.080	.020			.019	.007	—			
10	46.47	7.87	1.58	8.63	13.32	15.85	1.81	1.65	0.09		2.70				99.97	
A3. III	.775	.077	.010	.119	.333	.283	.029	.018			.034					
11	43.58	8.08	5.00	5.77	12.91	8.88	0.90	5.99	1.95	1.15	4.64	0.62	0.21	CO ₂ 0.11 ZrO ₂ none Cl trace F none S none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.02 NiO 0.08 BaO 0.32 SrO trace Li ₂ O none CuO 0.01	100.25	2.897
A1. I	.726	.079	.031	.081	.323	.159	.015	.064			.058	.004	.003			

ORDER 2. DOPOLIC. SCOTARE. SECTION 2. DOPYRIC. PAULIARE. (C. I. P. W., 1902.)

SUBBRANG 1. PERMAGNESIC. VALBONNOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	IV.(1)2.2.1. 1(2).	or 7.23 di 47.92 ab 2.62 ol 9.25 an 18.35 mt 8.35 C 2.24	Vallée de Valbonne, Pyrenees.	Pisani.	A. Lacroix, B. Sv. Ct. G. Fr., XI, No. 71, p. 31, 1900.	Mica hornblende.	In W. T., p. 359.

SUBBRANG 2. DOMAGNESIC.

1	IV''.(1)2.(1)2.1. (1)2.	or 2.22 di 8.52 ab 9.96 hy 53.45 an 5.56 ol 9.39 mt 9.98 il 0.61	Insizwa, Mount Ayliff, East Griqualand.	W. Versfeld.	A. L. Du Toit, A. R. G. Com. Cape G. H., XV, p. 126, 1910.	Olivine norite.	
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SUBBRANG 2. DOMAGNESIC. MONTREALOSE. (F. D. ADAMS, 1913.)

1	(III)IV.2.2.2.2.	or 7.23 di 37.52 ab 8.64 ol 13.70 an 13.34 mt 7.19 ne 4.97 il 4.26 ap 0.67	Mount Royal, Montreal, Quebec.	M. F. Connor.	F. D. Adams, Cong. G. Int., XII, Guide 3, p. 39, 1913.	Montrealite (olivine essexite).	
2	(III)IV.2'' 2.2. 2(3).	or 3.34 di 23.94 ab 10.48 hy 7.82 an 20.02 ol 12.13 mt 14.15 il 4.56 ap 1.34	Big Timber Creek, Crazy Mountains, Montana.	W. F. Hille- brand.	J. E. Wolff, U. S. G. S. B. 148, p. 144, 1897.	Olivine gabbro.	In W. T., p. 359.
3	IV.2.2.2(3).2.	an 16.96 di 41.92 lc 1.31 ol 10.05 ne 1.99 cs 3.61 mt 19.49 il 3.19	Olivine Mountain, Tulameen Dis- trict, British Columbia.	M. F. Connor.	C. Cammel, Can. G. S. Mem. 26, p. 61, 1913.	Pyroxenite.	
4	IV.2.2.2.2.	or 8.90 ac 4.62 ab 5.76 di 37.84 ne 13.63 ol 15.69 mt 6.73 il 5.17 ap 1.34	Lugar, Ayrshire, Scotland.	A. Scott.	G. W. Tyrrell, pers. com.	Picrite- thermalite.	
5	IV.2.2.2.2.	or 8.34 di 37.42 ab 13.62 ol 10.57 an 3.06 mt 16.01 ne 5.96 il 3.65	Garabal Hill, n. Loch Lomond, Scotland.	Not stated.	Wyllie and Scott, G. Mag. (V), X, p. 502, 1913.	Davainite (horn- blendite).	
6	IV.2'' 2'' 2.2.	or 7.51 di 30.02 an 3.06 ol 14.56 lc 4.55 il 9.24 ne 15.62 hm 6.08 pt 3.67 cm 4.16	Höwenegg, Hegau, Baden.	U. Gruben- mann.	U. Grubenmann, In. Diss. Zur., p. 26, 1886.	Melilite basalt.	Ign.=0.89. In W. T., p. 359.
7	(III)IV.2.2.2.2.	an 16.96 di 32.07 lc 6.60 ol 11.47 ne 10.51 cs 1.03 mt 10.44 il 5.93 ap 1.34	Schaftruhe, Rhöngebirge.	Haefcke.	H. Froescholdt, Jb. Pr. G. L.-A., XIV, p. 12, 1894.	Nephelite basalt.	In W. T., p. 359.
8	(III)IV.(1)2.2.2.2.	or 2.22 di 37.56 an 6.95 ol 14.24 lc 3.49 mt 3.94 ne 23.28 il 3.65 ap 0.67	Hahn, n. Holzhausen, Habichtswald, Hesse.	P. Jannasch.	F. Rinne, Sb. Pr. Ak. W., p. 1026, 1889.	Limburgite.	In W. T., p. 355.
9	(III)IV.2.2(3). 2.2.	an 2.78 di 27.65 lc 8.72 ol 16.10 ne 22.72 cs 4.64 mt 11.83 il 2.89 hm 0.48 ap 2.35	Löbauerberg, Saxony.	J. Stock.	J. Stock, T. M. P. M., IX, p. 466, 1888.	Nephelite basalt.	In W. T., p. 363.
10	IV.(1)2.2.2(3).2.	an 8.34 di 55.79 lc 5.00 ol 11.68 ne 8.24 cs 0.17 mt 2.32 il 7.89	Tatarca River, Jenissei District, Siberia.	Not stated.	A. Munster, Reg. Aurif. Sib., IX, p. 158, 1910.	Hornblende pyroxenite.	
11	(III)IV.2.2(3).2.2.	or 15.57 di 31.97 lc 15.70 ol 17.82 ne 4.26 mt 6.03 il 8.82 hm 0.80 ap 1.34	El Capitan, New South Wales.	H. P. White.	Mingaye and White, Rec. G. S. N. S. W., VII, (4), p. 362, 1904.	Leucite basalt.	

CLASS IV. DOFEMANE—Continued.

RANG 2. DOMIRIC. MONTREALASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
12	41.50	12.31	5.20	8.46	11.29	14.05	2.06	0.48	0.50		4.78	0.06			100.69	
A2. II	.692	.121	.033	.118	.282	.251	.033	.005			.060	—				

RANG 2. DOMIRIC. MONTREALASE.

1	36.77	10.29	10.54	12.11	9.34	12.26	1.16	1.38	1.70	0.36	2.49	1.40	0.23	CO ₂ 0.18 S 0.33 NiO 0.03 BaO 0.04 SrO 0.02	100.63	3.288
A1. I	.613	.101	.066	.168	.234	.219	.019	.015			.031	.010	.003			
2	38.79	9.39	12.31	11.57	8.10	12.09	2.20	1.53	2.07		1.12	0.19	trace	S 0.60	99.96	3.115
A2. II	.647	.092	.077	.161	.203	.216	.035	.016			.014	.001	—			
3	42.03	10.21	9.05	10.60	9.20	16.45	1.31	0.64	0.99		0.46				100.94	
B3. IV	.701	.100	.057	.147	.230	.294	.021	.007			.006					

RANG 3. CALCIMIRIC. PAULASE. (C. I. P. W., 1902.)

1	38.39	7.05	9.07	6.17	11.58	19.01	0.74	0.75	0.33	0.14	4.54	0.82	0.32	X 0.24 ZrO ₂ none S 0.42 BaO trace	99.89	
A1. I	.640	.069	.057	.086	.290	.339	.012	.008			.057	.006	.005			
2	43.50	3.97	3.42	4.41	8.12	24.69	1.55	0.14	0.58	0.34	5.35	3.11	0.19	CO ₂ 0.66 ZrO ₂ none S 0.03 Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO none SrO 0.13	100.19	3.298
A1. I	.725	.039	.021	.061	.203	.441	.025	.002			.067	.022	.003			
3	58.38	6.15	11.70	8.14	11.47	18.60	0.78	0.13	0.54	0.18	4.32	0.17	0.16	CO ₂ none	100.72	
A2. II	.640	.060	.073	.113	.287	.332	.013	.001			.054	.001	.002			

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. MARQUETTASE. (C. I. P. W., 1902.)

1	45.63	8.83	4.79	5.92	20.30	7.83	0.63	0.34	4.23	0.14	1.44				100.10	3.05
A3. III	.761	.087	.030	.082	.508	.139	.010	.004			.018					

RANG 2. DOMIRIC. UVALDASE. (C. I. P. W., 1902.)

1	40.32	9.46	4.75	7.48	18.12	10.55	2.62	1.10	1.25	0.57	2.66	0.68	0.25	ZrO ₂ none SiO ₂ 0.03 Cl 0.05 F 0.04 S 0.01 NiO 0.06 BaO 0.06 SrO 0.03 Li ₂ O trace	100.09	3.148
A1. I	.672	.091	.030	.104	.453	.188	.042	.012	.057		.033	.005	.004			

ORDER 2. DOPOLIC. SCOTARE. SECTION 2. DOPYRIC. PAULIARE—Continued.

SUBRANG 2. DOMAGNESIC. MONTREALOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
12	(III)IV.2.2.2.2.	or 2.78 di 36.74 ab 3.14 ol 10.08 an 23.07 mt 7.66 ne 7.67 il 9.12	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 104, 1910.	Essexitic gabbro.	

SUBRANG 3. MAGNESIFEROUS.

1	"IV.2"(2)(3).2". "3.	or 8.34 di 26.60 ab 2.62 ol 14.70 an 18.63 mt 15.31 ne 3.98 il 4.71 ap 3.36	Caribou, Boulder County, Colorado.	G. Steiger.	E. S. Bastin, U. S. G. S. rec. lab.	Hornblende.	
2	"IV.2"(2).2".3.	or 8.90 di 38.56 ab 0.52 ol 7.90 an 11.40 mt 17.86 ne 9.66 il 2.13 ap 0.34	Wehrthal, Schwarzwald.	Not stated.	O. H. Erdmannsdoerfer, Mt. Bad. G. L. -A., IV. (2), p. 172, 1901.	Secretion in granite.	
3	IV.2.(1)2.2(3). (2)3.	an 20.02 di 49.87 lc 3.05 ol 7.21 ne 5.94 mt 13.22 il 0.91	Malinverno, Monzoni, Tyrol.	C. Doelter.	C. Doelter, T. M. P. M., XXI, p. 98, 1902.	Pyroxenite.	

SUBRANG 2. DOMAGNESIC. PAULOSE. (C. I. P. W., 1902.)

1	IV.2.2."3.2.	an 13.62 di 44.50 lc 3.49 ol 5.88 ne 3.41 cs 5.50 mt 7.89 il 8.66 hm 3.68 ap 2.02	Magnet Cove, Arkansas.	H. S. Washing- ton.	H. S. Washington, J. G., IX, p. 620, 1901.	Jacupirang- ite.	In W. T., p. 361.
2	IV."2.2.(2)3.2.	or 1.11 di 43.85 ab 13.10 wo 14.96 an 3.34 mt 4.87 il 6.54 tn 0.78 pl 2.72 ap 7.39	Iron Hill Area, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec lab.	Titanite pyroxenite.	
3	"IV.2.(1)2."3.2.	an 12.79 di 50.33 lc 0.44 ol 3.78 ne 3.69 cs 4.30 mt 14.15 il 8.21 hm 1.92 ap 0.34	Jacupiranga, Sao Paulo, Brazil.	H. S. Washing- ton.	H. S. Washington, J. G., IX, p. 620, 1901.	Jacupirang- ite.	In W. T., p. 361.

ORDER 2. DOPOLIC. SCOTARE. SECTION 3. PYROLIC. TEXTIARE.

SUBRANG 2. DOMAGNESIC. MARQUETTOSE. (C. I. P. W., 1902.)

1	IV.(1)2.(2)3 1(2). (1)2.	or 2.22 di 14.39 ab 5.24 hy 22.65 an 20.29 ol 25.29 mt 6.86 il 2.74	Clemgia, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. Kt. Schw., XXXIII, p. 223, 1909.	Hornblend- ite.	
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SUBRANG 2. DOMAGNESIC. UVALDOSE. (C. I. P. W., 1902.)

1	IV."2.3.2.2.	or 3.89 di 28.68 an 11.12 ol 28.75 lc 2.18 mt 6.76 ne 11.93 il 5.02 ap 1.68	Tom Munns Hill, Uvalde County, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 62, 1900.	Nephelite basalt.	In W. T., p. 361.
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CLASS IV. DOFEMANE—Continued.

RANG 2. DOMIRIC, UVALDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ C+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
2	39.92	8.60	4.40	8.00	20.17	10.68	1.91	1.03	1.45	0.43	2.70	0.51	0.24	ZrO ₂ none Cl trace F 0.07 S trace Cr ₂ O ₃ 0.14 V ₂ O ₅ 0.04 NiO 0.06 BaO 0.06 SrO 0.04 Li ₂ O trace	100.45	3.200
A1. I	.665	.084	.027	.111	.504	.191	.030	.011			.034	.004	.003			
3	37.96	10.14	3.69	7.59	14.69	16.28	2.18	0.69	1.82	0.39	2.93	1.13	0.22	ZrO ₂ none SO ₃ 0.03 Cl trace F 0.07 S 0.04 Cr ₂ O ₃ 0.08 V ₂ O ₅ 0.05 NiO 0.04 BaO 0.06 SrO 0.05 Li ₂ O trace	100.13	3.150
A1. I	.633	.099	.023	.106	.067	.291	.035	.007			.035	.008	.003			
4	37.98	9.30	5.96	5.86	17.13	10.38	3.50	2.03	2.74		2.02	0.31	trace	CO ₂ 0.36 X 2.40 S 0.09 SrO trace	100.15	3.072
A2. II	.633	.091	.037	.081	.428	.168	.056	.021			.025	.002	—			
5	38.06	9.97	5.59	5.78	15.06	15.22	1.81	0.94	3.55		2.96	0.57	trace	Cr ₂ O ₃ 0.05 NiO 0.75	100.31	3.077
A1. I	.634	.098	.035	.081	.377	.271	.029	.010			.037	.004	—			
6	38.87	11.94	4.02	6.00	15.24	10.87	2.59	1.64			4.79	trace		CO ₂ trace Cr ₂ O ₃ 3.06	99.02	2.946
B2. III	.648	.117	.025	.083	.381	.194	.042	.017			.060	—				
7	37.01	8.71	7.26	6.71	14.83	15.85	2.63	1.84	1.78		3.21	trace		Cr ₂ O ₃ 0.14	99.97	
A3. III	.634	.085	.046	.093	.371	.283	.042	.020			.040	—				
8	36.53	9.91	3.84	6.01	18.10	10.31	3.06	1.60			8.38	trace		CO ₂ trace Cr ₂ O ₃ 2.90	100.64	2.987
A3. III	.609	.097	.024	.083	.453	.184	.049	.017			.105	—				
9	35.56	11.25	6.62	6.67	14.68	8.99	3.86	1.75			8.03	trace		Cr ₂ O ₃ 2.66	100.07	3.046
A3. III	.593	.110	.041	.093	.367	.177	.062	.019			.100	—				
10	42.55	10.75	4.92	6.60	15.51	10.80	2.94	1.57	0.57		2.59	0.48	trace	Cr ₂ O ₃ 0.42 NiO 0.13	99.83	
A1. I	.709	.105	.031	.092	.388	.193	.047	.017			.032	.003	—			
11	42.47	8.62	3.41	7.73	15.11	10.47	3.61	2.35	0.37		2.61	3.29			100.04	
A2. II	.708	.085	.021	.107	.378	.188	.058	.025			.033	.023				
12	39.39	7.55	6.33	5.64	13.91	13.98	4.88	1.45	4.06		3.01	0.72		CO ₂ trace	100.92	
A2. II	.657	.074	.039	.078	.348	.250	.079	.015			.038	.005				
13	42.58	9.58	4.97	10.22	16.97	11.54	2.01	0.54	1.04		0.94	0.41	0.25		101.05	
B2. III	.710	.054	.031	.141	.424	.206	.032	.006			.012	.003	.004			
14	39.02	11.05	3.52	6.65	14.33	15.30	2.24	1.38	1.75	0.36	3.31	1.23			100.14	
A2. II	.650	.108	.022	.093	.358	.273	.036	.015			.041	.009				

ORDER 2. DOPOLIC. SCOTARE. SECTION 3. PYROLIC. TEXTIARE—Continued.

SUBRANG 2. DOMAGNESIC. UVALDOSE.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
2	IV.(1)2.3.2.'2.	an 11.95 di 28.24 lc 4.80 ol 31.27 ne 8.52 cs 0.52 mt 6.26 il 5.17 ap 1.34	Black Mountain, Uvalde County, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 63, 1900.	Nephelite basalt.	In W. T., p. 361.
3	IV.'2.3''2''2.	an 15.85 di 22.45 lc 3.05 ol 23.34 ne 9.94 cs 9.03 mt 5.34 il 5.32 ap 2.69	Near Uvalde, Uvalde County, Texas.	W. F. Hille- brand.	W. Cross, U. S. G. S. B. 168, p. 63, 1900.	Nephelite- melilite basalt.	In W. T., p. 363.
4	''IV.2.3.2.'2.	an 3.89 di 24.35 lc 9.16 ol 24.00 ne 15.90 cs 3.10 mt 8.58 il 3.65 ap 0.67	Hohenburg, n. Bühne, Westphalia.	Biltz.	F. Rinne, Sb. Pr. Ak. W., 1891, p. 988.	Melilite- nephelite basalt.	In W. T., p. 363.
5	IV.2.3.2.2.⊙	an 16.40 di 26.11 lc 4.36 ol 19.74 ne 8.24 cs 6.71 mt 8.12 il 5.62 ap 1.34	Wartenberg, n. Geisingen, Baden.	M. Dittrich.	E. Becker, Z. D. G. G., LIX, p. 274, 1907.	Melilite basalt.	
6	(III)IV.2''3.2.'2.	an 16.12 di 26.35 lc 7.41 ol 18.20 ne 11.93 cs 1.20 mt 0.70 il 9.12 hm 3.52 cm 4.45	Hohenhōwen, Hegau, Baden.	U. Gruben- mann.	U. Grubenmann, In. Diss. Zür., p. 31, 1886.	Melilite basalt.	Ign.=2.82. In W. T., p. 361.
7	IV.2.3''2(3).2.	an 6.39 di 22.71 lc 8.72 ol 19.27 ne 11.93 cs 13.24 mt 10.67 il 6.08	Neuhöwen, n. Stetten, Hegau, Baden.	L. Hezner.	H. Rosenbusch, Elem. Gest., p. 467, 1910.	Melilite basalt.	
8	''IV.2''3.2.(1)2.	an 8.62 di 21.38 lc 7.41 ol 24.78 ne 13.92 cs 1.20 il 9.73 hm 3.84 cm 3.95 pf 5.44	Wartenberg, Hegau, Baden.	U. Gruben- mann.	U. Grubenmann, In. Diss. Zür., p. 20, 1886.	Melilite basalt.	Ign.=2.47. In W. T., p. 361.
9	(III)IV.2(3).3.2.2.	an 8.06 di 19.22 lc 8.28 ol 19.46 ne 17.61 cs 3.10 il 11.40 hm 6.62 cm 2.74 pf 3.13	Hohenstoffeln, Hegau, Baden.	U. Gruben- mann.	U. Grubenmann, In. Diss. Zür., p. 35, 1886.	Melilite basalt.	Ign.=1.72. In W. T., p. 365.
10	(III)IV.2.(2)3.2.2.	or 9.45 di 30.99 ab 1.31 ol 19.76 an 11.40 mt 7.19 ne 12.64 il 4.36 cm 0.62 ap 1.01	Oberbach, Rhöngebirge.	M. Dittrich.	J. Soellner, N. J. B. B., XXIV, p. 511, 1907.	Limburgite.	
11	(III)IV.'2.3.2.2.	or 13.90 di 23.96 ab 7.86 ol 23.82 an 0.56 mt 4.87 ne 12.21 il 5.02 ap 7.73	Wilhelmshöhe, Habichtswald, Hesse Nassau.	M. Dittrich.	K. Schlossmacher, N. J. B. B., XXXI, p. 666, 1911.	Shonkinitic trachy- dolerite.	
12	IV.2.3.2(3).2	lc 6.54 ac 9.24 ne 16.76 di 21.79 ol 19.41 cs 11.18 mt 4.41 il 5.78 ap 1.68	Eisenrüttel, Schwäbischer Alb, Bavaria.	E. Gaiser.	E. Gaiser, In. Diss. Bresl., p. 5, 1904.	Nephelite basalt.	
13	IV.(1)2.3.2.2.	or 3.34 di 31.10 ab 3.14 ol 29.42 an 15.57 mt 7.19 ne 7.38 il 1.82 ap 1.01	Mindello, St. Vincent, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 283, 1896.	Dolerite.	In W. T., p. 363.
14	''IV.2.3(4).2''2.	an 15.85 di 18.58 lc 6.54 ol 21.95 ne 10.22 cs 8.69 mt 5.10 il 6.23 ap 3.02	Laona, Ankaratra, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Melilite nephelin- ite.	

CLASS IV. DOFEMANE—Continued.

RANG 2. DOMIRIC. UVALDASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
15	42.99	10.21	3.01	10.28	14.61	12.54	1.40	0.52	1.10	0.82	2.52	0.29	0.17	CO ₂ none ZrO ₂ none Cr ₂ O ₃ 0.06 NiO 0.06 BaO none SrO none	100.58	
A1. I	.717	.100	.019	.143	.365	.224	.023	.006			.032	.002	.002			
16	37.50	9.12	5.59	8.81	13.72	13.85	2.69	0.63	2.35	1.05	3.21	0.90	0.15	CO ₂ 0.27 ZrO ₂ 0.02 Cl 0.05 S trace Cr ₂ O ₃ 0.07 V ₂ O ₅ 0.05 NiO 0.04 BaO 0.07 SrO 0.05 Li ₂ O trace	100.19	
A1. I	.625	.089	.035	.122	.343	.247	.043	.006			.040	.006	.002			
17	36.34	10.14	6.53	10.66	10.68	13.10	4.54	1.78	1.00	1.00	2.87	1.02	0.20	CO ₂ 0.15 S 0.04	100.05	
A2. II	.606	.099	.041	.148	.267	.234	.074	.019			.036	.007	.003			
18	43.51	9.82	6.32	9.62	14.97	11.83	1.30	0.25	0.64		1.02	0.03	0.21		99.52	
A2. II	.725	.096	.039	.133	.374	.211	.021	.003			.013	—	.003			

RANG 3. CALCIMIRIC.

1	38.04	6.34	8.45	5.90	7.81	27.19	2.16	0.12	0.48	0.22	1.98	0.24	0.23	CO ₂ 0.30 ZrO ₂ none S 0.02 Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO none SrO 0.26	99.74	3.257
A1. I	.634	.062	.053	.082	.195	.486	.035	.001			.025	.002	.003			
2	33.52	7.60	10.69	6.98	6.94	22.82	3.52	1.37			4.51	2.31			100.26	
A2. II	.559	.074	.067	.097	.174	.408	.056	.015			.056	.016				
3	38.74	11.30	4.28	7.71	11.97	14.43	3.02	1.92	1.28	0.60	3.30	1.77			100.32	
A2. II	.646	.111	.027	.107	.299	.257	.048	.020			.041	.012				

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC.

1	38.62	4.71	8.72	4.08	32.32	3.97	0.17	0.20	6.46		0.60	trace		Cr ₂ O ₃ 0.43	100.28	2.931
A2. II	.644	.046	.054	.057	.808	.071	.003	.002			.008	—				

RANG 1. PERMIRIC.

1	39.14	7.59	5.26	8.76	22.78	5.91	0.60	1.09	6.30	0.56	1.66	0.38	0.56	NiO 0.11	100.70	
A2. II	.652	.074	.033	.122	.570	.105	.010	.012			.021	.003	.008			
2	39.58	7.25	4.44	10.46	24.75	4.83	0.97	0.32	5.68	1.11	0.99				100.38	2.89
A3. III	.660	.071	.028	.145	.619	.086	.016	.003			.012					
3	43.82	10.10	2.98	10.44	20.89	7.66	1.44	0.62	0.02		2.07	0.21			100.25	
A2. II	.730	.099	.019	.145	.522	.137	.023	.007			.026	.002				

ORDER 2. DOPOLIC. SCOTARE. SECTION 3. PYROLIC. TEXIARE—Continued.

SUBRANG 2. DOMAGNESIC. UVALDOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
15	"IV.(1)2."3.2.2.	or 3.34 di 32.93 ab 5.24 ol 23.82 an 19.74 mt 4.41 ne 3.69 il 4.86 ap 0.67	Haleakala, Maui, Hawaiian Islands.	G. Steiger.	W. Cross, U. S. G. S. P. P. 88, p. 29, 1915.	Basalt.	
16	IV.2."3.2.2.	an 11.12 di 31.90 lc 2.62 ol 18.28 ne 12.21 cs 3.61 mt 8.12 il 6.08 ap 2.02	Kilauea Bay, Kauai, Hawaiian Islands.	W. F. Hille- brand.	W. Cross, U. S. G. S. P. P. 88, p. 17, 1915.	Melilite- nephelite basalt.	
17	"IV.2.3(4).2(3). 2(3).	an 1.67 di 20.30 lc 8.28 ol 19.79 ne 21.02 cs 9.29 mt 9.51 il 5.47 ap 2.35	Moilili church, Honolulu, Oahu, Hawaiian Islands.	G. Steiger.	W. Cross, U. S. G. S. P. P. 88, p. 22, 1915.	Nephelite- melilite basalt.	
18	"IV."2.3.2.2.	or 1.67 di 30.85 ab 11.00 ol 24.19 an 20.02 mt 9.05 il 1.98	Nakety, New Caledonia.	Boiteau.	A. Lacroix, C. R., CLII, p. 820, 1911.	Hornblend- ite.	

SUBRANG 2. DOMAGNESIC. (NAKETOSE, A. LACROIX, 1911.)

1	IV.2.(2)3.3.2.	an 7.23 di 39.07 lc 0.44 ol 1.57 ne 9.94 cs 23.39 mt 12.30 il 3.80 ap 0.67	Iron Hill, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Uncompah- grite (melilite rock).	
2	IV.2.3.3(4).2(3).	an 0.83 di 25.49 lc 6.54 ol 3.92 ne 15.90 cs 20.12 mt 9.51 il 8.51 hm 4.16 ap 5.38	Bad na Achlaise, n. Ledmore, Assynt, Scotland.	A. Gemmel.	A. Gemmel, Tr. G. Soc. Edin., IX (5), p. 417, 1910.	Cromaltite.	
3	(III)IV.2."3(2). 3.2.	an 12.23 di 27.67 lc 8.72 ol 15.64 ne 13.63 cs 4.05 mt 6.26 il 6.23 ap 4.03	Mount Tsiafa- javona, Madagascar.	Boiteau.	A. Lacroix, C. R., CLVI, p. 177, 1913.	Nephelinite.	

ORDER 2. DOPOLIC. SCOTARE. SECTION 4. DOMOLIC.

SUBRANG 1. PERMAGNESIC.

1	IV(V)."2.(3)4. 1.1".	or 1.11 di 6.48 ab 1.57 hy 16.60 an 11.40 ol 42.84 mt 10.67 il 1.22 cm 0.67 hm 1.28	Ehrsberg, Schwarzwald.	J. H. Kloos.	J. H. Kloos, N. J. B. B., III, p. 57, 1885.	Picrite.	Not fresh. In W. T., p. 363.
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SUBRANG 2. DOMAGNESIC.

1	IV."2.4.1"/."2.	or 6.67 di 9.42 ab 5.24 hy 5.89 an 14.46 ol 40.33 mt 7.66 il 3.19 ap 1.01	Criffle Mill, Molenich, Cornwall.	E. G. Radley.	J. S. Flett, G. S. Eng. Mem. Sh. 348, p. 101, 1907.	Hornblende picrite.	
2	IV.(1)2.4.1.2.	or 1.67 di 7.50 ab 8.38 hy 6.05 an 14.46 ol 47.18 mt 6.50 il 1.82	Medenbach, n. Dillenburg, Hesse Nassau.	R. Brauns.	R. Brauns, N. J. B. B., XVIII, p. 292, 1904.	Picrite.	
3	(III)IV.(1)2.4. 1(2).2.	or 3.89 di 13.50 ab 12.05 hy 2.00 an 19.18 ol 40.72 mt 4.41 il 3.95 ap 0.67	Lava of 1897, Reunion.	Boiteau.	A. Lacroix, C. R., CLIV, p. 253, 1912.	Olivine basalt.	

CLASS IV. DOFEMANE—Continued.

RANG 2. DOMIRIC. CASSELASE. (C. I. P. W., 1902.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	43.15	9.53	3.40	11.46	16.89	8.53	1.51	0.87	1.28	0.76	2.28	0.13	0.18	CO ₂ 0.34 ZrO ₂ none SO ₃ none S 0.04 Cr ₂ O ₃ 0.03 V ₂ O ₅ 0.04 NiO none BaO none SrO none	100.61	
A1. I	.719	.093	.021	.159	.422	.154	.025	.009			.026	.001	.003			
2	40.12	7.76	7.35	8.66	23.69	6.53	1.20	0.53	4.03		0.37	0.18		CO ₂ trace Cl trace FeS ₂ trace Cu trace	100.62	2.988
A2. II	.669	.076	.046	.121	.592	.116	.018	.006			.005	.001				
3	38.35	12.02	3.20	8.32	18.70	9.11	3.15	0.84	3.26		3.02	0.43			100.40	
A2. II	.639	.118	.020	.115	.468	.163	.051	.009			.038	.003			(100.37)	
4	39.20	6.24	8.34	7.32	25.65	8.94	1.49	1.16	0.57		0.40		0.45		99.76	
A2. II	.653	.061	.052	.102	.641	.160	.024				.005		.006			

RANG 2. DOMIRIC. CASSELASE.

1	36.17	11.88	11.37	4.17	14.22	11.54	5.38	2.07	n. d.		2.15	0.84	trace		99.79	3.147
A2. II	.603	.117	.071	.058	.356	.206	.087	.022			.028	.006	—			

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. KALTENASE. (C. I. P. W., 1902.)

1	34.71	10.74	7.38	14.31	19.09	0.45	0.95	4.97	1.24	0.18	6.12				100.14	3.275
A3. III	.579	.105	.046	.199	.477	.008	.015	.053			.077					

RANG 1. PERMIRIC. KALTENASE.

1	34.98	10.80	1.42	21.33	19.30	0.43	0.17	5.42	1.28		5.18			SO ₃ trace	100.31	3.276
A3. III	.583	.106	.009	.296	.483	.007	.003	.058			.065					

RANG 2. DOMIRIC.

1	31.17	6.25	3.22	9.64	19.90	17.76	2.03	2.51	2.05	0.44	2.96	1.69		Cr ₂ O ₃ trace	99.62	3.122
A2. II	.520	.061	.020	.134	.498	.317	.032	.027			.037	.012				

RANG 3. CALCIMIRIC.

1	34.03	8.41	3.13	6.67	14.68	18.20	4.58	1.69	4.02		2.69	1.10		CO ₂ trace SO ₃ 0.94	100.14	
A2. II	.567	.082	.019	.093	.367	.325	.074	.018			.034	.008				

CLASS IV. DO FEMANE.

RANG 1. PERMIRIC. BERGENASE. (C. I. P. W., 1902.)

1	31.59	8.54	2.36	24.52	10.70	2.25	1.03	0.15	n. d.		18.49	0.02			99.65	
A2. II	.527	.084	.015	.340	.267	.040	.016	.002			.231	—				

ORDER 2. DOPOLIC. SCOTARE—Continued.

SUBRANG 2. DOMAGNESIC. CASSELOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	(III)IV.(1)2.(3) 4.(1)2.2.	or 5.00 di 20.51 ab 12.05 ol 34.19 an 16.40 mt 4.87 ne 0.57 il 3.95 ap 0.34	Stony Point, New York.	G. Steiger.	J. P. Iddings, Ign. Rocks, II, p. 337, 1913.	Cortlandite.	
2	IV."2.4.(1)2."2.	or 3.34 di 13.40 ab 9.43 ol 44.09 an 14.46 mt 10.67 il 0.76	Highweek, Newton Bushel, Devonshire, England.	K. Busz.	K. Busz, N. J., 1895, I, p. 74.	Picrite.	In W. T., p. 363.
3	(III)IV."2."4. (1)2.2.	an 16.12 di 16.46 lc 3.92 ol 23.07 ne 14.48 mt 4.64 il 5.78 ap 1.01	Essay-le-cote, Vosges, France.	Pisani.	A. Michel-Levy, C. R., CXLVIII, p. 1530, 1909.	Nephelinite.	
4	IV."2.4.(1)2.(1)2.	an 6.95 di 20.52 lc 5.23 ol 43.27 ne 6.82 cs 3.53 mt 12.06 il 0.76	Mount Kjetknjun, Lujavr Urt, Kola, Finland.	W. Petersson.	W. Ramsay, Fennia, XV, No. 2, p. 27, 1898.	Picrite porphyry.	

SUBRANG 3. MAGNESIFERROUS.

1	(III)IV.2.4.2."3(4).	an 2.22 di 12.53 lc 9.59 ol 20.86 ne 24.71 cs 10.32 mt 6.96 il 4.26 hm 6.56 ap 2.02	Shannon Tier, Hobart, Tasmania.	F. P. Paul.	F. P. Paul, T. M. P. M., XXV, p. 305, 1906.	Melilite- nephelite basalt.	Cf. No. 12, III.7.3.4.
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ORDER 2. DOPOLIC. SCOTARE. SECTION 5. PEROLIC.

SUBRANG 2. DOMAGNESIC.

1	(III)IV.2(3).5.1.2.	or 9.45 ol 41.14 an 2.22 ol 10.67 lc 15.70 il 11.70 ne 4.26 C 2.96	Kaltenthal, Harz.	H. Hirschi.	H. Hirschi, In. Diss. Zür., p. 26, 1901.	Mica peridotite.	
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SUBRANG 3. MAGNESIFERROUS. KALTENOSE. (C. I. P. W., 1902.)

1	IV."2.5.1.(2)3.	an 2.22 ol 56.45 lc 19.62 mt 2.09 ne 0.85 il 9.88 kp 4.11 C 3.88	Upper Kaltenthal, Harz.	Hampe.	M. Koch, Z. D. G. G., XLI, p. 165, 1889.	Mica peridotite.	In W. T., p. 363.
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SUBRANG 2. DOMAGNESIC.

1	IV.2.5.2."2.	an 0.56 ol 38.64 ne 9.09 cs 23.74 kp 8.53 mt 4.64 il 5.62 ap 4.03 (Mg,Fe)O 2.21	Sutherland, Cape Colony.	M. Dittrich.	P. A. Wagner, Diam. Flds. S. Afr., p. 105, 1914.	Melilite basalt.	
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SUBRANG 2. DOMAGNESIC.

1	IV."2.5."3.2.	an 0.56 di 3.27 lc 7.85 ol 28.69 ne 17.61 cs 24.42 th 1.70 mt 4.41 il 5.17 ap 2.69	Gräbenstetten, n. Urach, Schwäbische Alb, Bavaria.	E. Gaiser.	E. Gaiser, In. Diss. Bres., p. 17, 1904.	Nosean- melilite basalt.	
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ORDER 3. POLMITIC. SVERIGARE (C. I. P. W., 1902). SECTION 1. PERPYRIC. BERGENIARE. (C. I. P. W., 1902.)

SUBRANG 3. MAGNESIFERROUS. BERGENOSE. (C. I. P. W., 1902.)

1	IV.3.1"1.3.	or 1.11 hy 34.32 ab 8.38 ol 3.46 an 11.12 mt 3.48 C 2.65 il 35.11	Storgang, Soggendal, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 165.	Ilmenite norite.	In W. T., p. 365.
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CLASS IV. DOFEMANE—Continued.

RANG 1. PERMIRIC. BERGENASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	41.64	5.86	12.72	19.94	3.97	3.70	1.53	2.53	0.73	0.09	3.88	2.52	1.10		100.21	3.18
A2. II	.694	.057	.079	.276	.099	.066	.024	.027			.049	.018	.014			

RANG 1. PERMIRIC. BERGENASE.

1	24.50	0.48	35.14	32.28	1.25	2.07	n. d.	n. d.	n. d.		1.28	0.01	2.89	S 0.01 Cr ₂ O ₃ 0.08 V ₂ O ₅ trace	99.98	
B2. III	.408	.005	.220	.448							.016	—	.041			

RANG 2. DOMIRIC. TUXENASE. (H. S. WASHINGTON, 1917.)

1	36.70	11.00	14.21	12.24	7.55	11.90	0.95	0.22	1.36		3.85				99.98	
A3. III	.612	.108	.089	.170	.189	.213	.015	.002			.048					

RANG 3. CALCIMIRIC. IUSSASE. (H. S. WASHINGTON, 1917.)

1	39.43	10.36	13.19	3.98	5.53	15.50	4.23	2.24	0.81		2.27	2.76	trace		100.30	3.058
A2. II	.657	.102	.082	.056	.138	.277	.068	.023			.028	.020	—			

RANG 3. CALCIMIRIC. IUSSASE.

1	36.24	9.05	10.64	9.58	7.75	14.97	1.05	0.43	0.65		7.12	1.01	0.29	FeS ₂ 0.97	99.75	
A2. II	.604	.089	.067	.133	.194	.268	.017	.005			.089	.007	.004			
2	39.48	5.76	8.42	7.55	5.98	12.72	2.08	1.26	2.57	0.42	10.90	1.53	0.27	CO ₂ trace Cl none S 0.22 Cr ₂ O ₃ none BaO trace	99.16	3.043
B1. II	.658	.057	.053	.105	.150	.227	.034	.014			.136	.011	.004			

CLASS IV. DOFEMANE.

RANG 2. DOMIRIC.

1	35.84	10.48	7.25	6.62	12.95	10.90	3.53	1.51			8.85	trace		Cr ₂ O ₃ 2.84	100.77	3.051
A2. II	.597	.103	.045	.092	.324	.194	.056	.016			.111	—				

RANG 3. CALCIMIRIC. AVEZACASE. (C. I. P. W., 1902.)

1	31.80	10.96	12.23	9.79	8.40	17.34	0.66	0.27	1.50		3.25	3.32			99.46	
A2. II	.530	.108	.076	.137	.210	.310	.011	.003			.041	.023				

CLASS IV. DOFEMANE.

RANG 2. DOMIRIC. ELDORASE. (E. S. BASTIN.)

1	30.47	9.04	16.37	14.91	7.86	9.33	0.77	2.89	1.32	0.32	2.52	2.87	0.39	CO ₂ 0.21 S 0.09 CaO 0.03 BaO 0.09 SrO 0.04	100.12	3.374
A1. I	.508	.089	.103	.207	.197	.166	.012	.031			.032	.020	.006			

ORDER 3. POLMITIC. SVERIGARE. SECTION 1. PERPYRIC. BERGENIARE—Continued.

SUBBRANG 4. DOFERROUS.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	(III)IV.3.1.1(2).4.	Q 6.90 hy 31.28 or 15.01 mt 18.33 ab 12.58 il 7.45 an 1.67 ap 6.05	Boval Road, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Lampro- phyre.	Erratic block.

SUBBRANG 5. PERFERROUS.

1	IV(V).3(4).1.1.5.	Q 9.30 hy 33.40 C 0.48 mt 51.00 il 2.47	Tucker Lake, Minnesota.	J. T. Singewald.	J. T. Singewald, U. S. Bur. Min. B. 64, p. 105, 1913.	Magnetite ore.	In gabbro. $MgO=MgCO_3$. $CaO=CaCO_3$.
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SUBBRANG 3. MAGNESIFERROUS. TUXENOSE. (E. GOURDON, 1908.)

1	(111)IV."3.1"2. 3.	or 1.11 di 26.93 ab 7.86 hy 7.12 an 25.30 ol 2.40 mt 20.65 il 7.30	Cape Tuxen, Graham Land, Antarctica.	Pisani.	E. Gourdon, Exp. Ant. Charc., Pet., p. 159, 1908.	Gabbro.	
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SUBBRANG 2. DOMAGNESIC.

1	(111)IV.(2)3.1.3"2. 2.	or 12.79 di 29.81 ab 3.14 wo 7.08 an 3.06 mt 6.50 ne 17.61 il 4.26 hm 8.64 ap 6.72	Löbauer Berg, Saxony.	J. Stock.	J. Stock, T. M. P. M., IX, p. 466, 1888.	Nephelite dolerite.	In W. T., p. 359.
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SUBBRANG 3. MAGNESIFERROUS. IJUSOSE. (H. S. WASHINGTON, 1916.)

1	IV."3.1.(2)3."3.	or 2.78 di 38.45 ab 5.50 ol 1.12 an 18.63 mt 11.14 ne 1.85 il 13.53 hm 3.04 ap 2.35	Mount Yamaska, Quebec.	G. A. Young.	G. A. Young, Can. G. S. A. R., XVI (1904), p. 40 H, 1906.	Yamaskite.	Incorrect. P_2O_5 on p. 33 H.
2	IV.3.1.3."3.	Q 1.38 di 32.40 or 7.78 wo 0.46 ab 17.82 hm 8.42 an 2.50 il 16.57 tn 5.29 ap 3.70	Near Siutik, Minassinsk, Jenissei, Siberia.	M. Dittrich.	J. Rakovski, Tr. Mus. Pet. Gr., Ac. Sci. St. Pet., V, p. 256, 1911.	Ijussite (pyrox- enite).	

ORDER 3. POLMITIC. SVERIGARE. SECTION 2. DOPYRIC

SUBBRANG 2. DOMAGNESIC.

1	(III)IV.(2)3.2"2. 2.2.	or 2.22 di 27.22 an 8.62 ol 13.86 lc 5.23 il 11.25 ne 15.90 hm 7.25 cm 3.74 pf 5.03	Randen, Hegau, Baden.	U. Gruben- mann.	U. Grubenmann, In. Diss. Zür., p. 23, 1886.	Melilite basalt.	Ign.=1.92. In W. T., p. 365.
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SUBBRANG 3. MAGNESIFERROUS. AVEZACOSE. (C. I. P. W., 1902.)

1	IV.(2)3.2.(2)3. (2)3.	an 26.13 di 27.13 lc 1.31 ol 7.71 ne 3.12 cs 1.29 mt 17.63 il 6.23 ap 7.73	Avezac-Prat, Pyrenees, France.	Pisani.	A. Lacroix, Cong. G. Int., VIII, C. R., p. 832, 1901.	Avezacite.	In W. T., p. 365.
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ORDER 3. POLMITIC. SVERIGARE. SECTION 3. PYROLIC. UTEIARE. (E. S. BASTIN.)

SUBBRANG 3. MAGNESIFERROUS. ELDOROSE. (E. S. BASTIN.)

1	"IV.3.3(4).2.3.	or 13.62 di 11.99 an 12.79 ol 17.70 lc 2.83 mt 23.90 ne 3.41 il 4.86 ap 6.72	Caribou, Boulder County, Colorado.	G. Steiger.	E. S. Bastin. U. S. G. S. rec. lab.	Magnetite gabbro.	
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CLASS IV. DOFEMANE.

RANG 1. PERMIRIC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	23.16	5.64	17.64	32.78	7.73	2.31	0.96	0.26	0.66	0.15	6.61	0.04	0.78	ZrO ₂ 0.02 Cl 0.04 F 0.02 S 0.16 Cr ₂ O ₃ 0.80 V ₂ O ₅ 0.08 NiO 0.20 BaO 0.01 Cu trace	100.05	
A1. I	.386	.055	.110	.455	.193	.041	.016	.003			.083	—	.011			

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. ARAPAHASE. (WASHINGTON AND LARSEN, 1913.)

1	19.74	9.72	39.70	15.60	3.70	6.64	0.46	0.66	0.32	0.04	0.58	1.67	0.38	CO ₂ none Cr ₂ O ₃ none V ₂ O ₅ 0.44 NiO none	99.75	
A1. I	.329	.095	.248	.217	.093	.120	.007	.007			.007	.012	.005			

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. ADIRONDACKASE. (C. I. P. W., 1902.)

1	21.42	7.03	30.34	22.81	6.92	3.59	0.53	0.41	0.95		5.21	0.14	trace	CO ₂ trace Cl 0.42 S 0.04 Cr ₂ O ₃ none C trace	99.81	
A1. I	.357	.069	.190	.317	.173	.064	.009	.004			.064	.001	—			
2	11.73	6.46	30.68	27.92	3.35	3.95	0.50	0.26	0.64		12.31	0.82		CO ₂ 0.32 Cl 0.12 F trace S 0.04 V ₂ O ₅ 0.04 C 0.05	99.19	4.138
A1. I	.196	.063	.192	.388	.084	.071	.008	.003			.150	.006				
3	20.30	7.60	29.99	25.65	3.68	3.50	n. d.	n. d.	1.70		7.80	0.03	0.34	SO ₃ 0.10	100.69	
B2. III	.338	.074	.187	.356	.092	.063					.123		.005			

RANG 1. PERMIRIC. ADIRONDACKASE.

1	17.11	2.70	35.61	30.00	1.70	2.50	n. d.	n. d.	n. d.		6.50	trace	1.75	S 0.01 Cr ₂ O ₃ 1.11 V ₂ O ₅ 1.01	100.00	
B2. III	.285	.026	.223	.417							.081	—	.025			

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. CHAMPLAINASE. (C. I. P. W., 1902.)

1	17.90	10.23	15.85	27.95	6.04	2.86	n. d.	n. d.	1.33		15.66	0.04	trace	CO ₂ 0.10 S 0.14 Cr ₂ O ₃ 0.51 V ₂ O ₅ 0.55	99.15	4.138
A1. I	.298	.100	.099	.389	.151	.051					.196	—	—			
2	13.35	8.75	20.35	28.82	6.63	2.15	n. d.	n. d.	1.68		16.45	0.02		CO ₂ 0.17 Cl trace S 0.09 Cr ₂ O ₃ 0.55 V ₂ O ₅ 0.61 C trace	99.62	
A1. I	.223	.086	.127	.400	.166	.039					.201	—				
3	26.62	11.62	19.50	21.87	2.57	6.47	1.06	0.34	1.30		9.50		0.20		101.05	
B2. III	.444	.115	.122	.304	.064	.116	.017	.003			.119		.003			

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC.

1	21.65	4.89	46.14	21.53	1.20	0.06	n. d.	n. d.	n. d.		none	0.01	2.60	Cr ₂ O ₃ 1.01 V ₂ O ₅ 0.91	100.00	
B2. III	.361	.048	.288	.299							—	—	.037			

ORDER 3. POLMITIC. SVERIGARE. SECTION 5. PEROLIC.

SUBRANG 4. DOFERROUS.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	IV''3.5.1.4.	or 1.67 di 1.18 ab 3.14 ol 40.71 an 10.01 mt 25.32 ne 2.84 il 12.82 cm 1.16	Grunna, S. Ulfön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 100, 1913.	Titaniferous iron ore.	

ORDER 4. DOMITIC. ADIRONDACKARE. (C. I. P. W. 1902.) SUBORDER 1. PERHEMIC.

SUBRANG 4. DOFERROUS. ARAPAHOSE. (WASHINGTON AND LARSEN, 1913.)

1	IV.4(5).1.1(2).4.	or 3.89 hy 7.70 ab 3.67 ol 1.12 an 22.24 mt 49.88 C 0.10 il 1.06 hm 5.28 ap 4.03	Pole Mountain, North Park, Colorado.	H. S. Washing- ton.	Washington and Larsen, J. Wash. Ac. Sci., III, p. 450, 1913.	Arapahite (magnetite basalt).	
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ORDER 4. DOMITIC. ADIRONRACKARE. SUBORDER 2. DOHEMIC. ADIRONDACKORE. (C. I. P. W., 1902.)

SUBRANG 4. DOFERROUS. ADIRONDACKOSE. (H. S. WASHINGTON, 1917.)

1	IV.4''2.1.(3).4.	or 2.22 di 1.11 ab 4.72 hy 9.00 an 15.57 ol 11.64 mt 44.08 il 9.73 ap 0.34	Elizabethtown, Essex County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. A. R. 19 (III), p. 408, 1899.	Titaniferous iron ore.	In W. T., p. 365.
2	IV''4(5).2''1.4''.	an 14.46 ol 10.57 lc 1.31 mt 44.54 ne 2.27 il 22.80 ap 2.02	Lincoln Pond, Essex County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. A. R. 19 (III), p. 407, 1899.	Titaniferous iron ore.	In W. T., p. 365.
3	IV.4.2.1.4.⊙	Q 4.14 hy 15.93 an 17.51 mt 43.38 C 1.12 il 18.70	Joubrechikine, Wichera, Ural Mountains.	Mine analysts.	Duparc et al., Urals Nords, III, p. 187, 1909.	Magnetite rock.	Segregation in gabbro.

SUBRANG 5. PERFERROUS.

1	IW(V).4.2.1.5.	Q 9.24 hy 17.29 C 2.70 mt 51.74 il 12.31 cm 1.57	Iron Lake, Minnesota.	J. T. Singe- wald.	J. T. Singewald, U. S. Bur. Min. B. 64, p. 106, 1913.	Iron ore.	In gabbro. MgO=MgCO ₃ . CaO=CaCO ₃ .
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ORDER 4. DOMITIC. ADIRONDACKARE. SUBORDER 3. TILHEMIC. CHAMPLAINORE. (C. I. P. W., 1902.)

SUBRANG 4. DOFERROUS. CHAMPLAINOSE. (H. S. WASHINGTON, 1917.)

1	IV.4.3''1.4.	an 14.18 hy 17.79 C 5.00 ol 5.84 mt 22.97 il 29.79 cm 0.67	Split Rock mine, Essex County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. A. R. 19 (III), p. 402, 1899.	Titaniferous iron ore.	In W. T., p. 365.
2	IV''4.3.1.4.	an 10.84 hy 5.91 C 4.79 ol 14.26 mt 29.46 il 30.55 cm 0.90	Elizabethtown, Essex County, New York.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. A. R. 19 (III), p. 405, 1899.	Titaniferous iron ore.	In W. T., p. 365.
3	(III)IV.4.(2).3. 1.4''.	or 1.67 di 4.99 ab 8.91 hy 5.30 an 26.41 ol 6.46 mt 28.30 il 18.09	Joubrechikine, Wichera, Ural Mountains.	Not stated.	Duparc et al., Urals Nord., III, p. 187, 1909.	Magnetite rock.	Also in C. R., CXLVII, p. 1063, 1908.

ORDER 5. PERMITIC. CORDILLERARE. (E. S. BASTIN.) SUBORDER 1. PERHEMIC.

SUBRANG 5. PERFERROUS.

1	IV.''5.1.1.5.	Q 19.20 hy 5.41 C 4.89 mt 60.82 cm 1.57	Iron Lake, Minnesota.	J. T. Singe- wald.	J. T. Singewald, U. S. Bur. Min. B. 64, p. 106, 1913.	Magnetite ore.	In gabbro.
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CLASS IV. DOFEMANE.

RANG 1. PERMIRIC. POMERASE. (E. S. BASTIN.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	10.77	4.61	39.27	21.73	2.34	4.84	0.31	0.24	0.44		13.52	0.02	0.37	S 0.11 V ₂ O ₅ 0.52 NiO 0.27 CoO 0.07 BaO 0.07	99.50	
A1. I	.180	.045	.245	.300	.059	.087	.005	.008			.189		.005			
2	10.37	5.01	37.25	28.82	4.23	4.40	0.57	0.12	0.47		8.17	0.09	0.31	S 0.04 Cr ₂ O ₃ 0.12 V ₂ O ₅ 0.29 NiO 0.26 CoO 0.04	100.66	
A1. I	.173	.049	.233	.400	.106	.079	.009	.001			.102	—	.004			
3	9.60	6.27	44.72	25.31	5.16	3.75	0.15	trace	n. d.	0.51	4.48	0.08			100.03	
A2. II	.160	.062	.279	.352	.129	.067	.002	—			.056	.001				

RANG 1. PERMIRIC. POMERASE.

1	20.67	2.20	41.43	24.05	1.54	0.05	n. d.	n. d.	n. d.		5.75	trace	0.20	Cr ₂ O ₃ 1.50 V ₂ O ₅ 2.60	99.99	
B2. III	.345	.022	.259	.330							.072	—	.003			

CLASS IV. DOFEMANE.

RANG 1. PERMIRIC.

1	0.99	25.35	24.03	14.26	1.90	19.86	none	none	0.37	0.39	12.50	0.58	0.24	CO ₂ 0.08 ZrO ₂ none S 0.01 Cr ₂ O ₃ none V ₂ O ₅ 0.06 NiO none BaO none SrO 0.06	100.68	4.335
A1. I	.017	.249	.150	.198	.048	.355	—	—			.158	.004	.003			

CLASS IV. DOFEMANE. SUBCLASS II. DOPOMIC.

RANG 2. DOMIRIC. ROSELANDASE. (WATSON AND TABER, 1913.)

1	33.83	5.19	11.38	15.08	8.57	8.22	1.28	0.50	0.75	0.45	10.00	4.84	0.26	CO ₂ trace Cl 0.04 F 0.55 S 0.25	101.19	
A1. I	.564	.051	.071	.210	.214	.146	.021	.005			.125	.034	.004		(101.39)	

CLASS IV. DOFEMANE. SUBCLASS II. DOPOMIC.

RANG 2. DOMIRIC. ROSELANDASE.

1	22.02	10.80	8.82	6.44	13.02	13.58	0.70	4.75	2.70	1.51	8.79	6.35	0.15	CO ₂ none ZrO ₂ none S 0.02 Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.03 NiO 0.02 BaO 0.48 SrO 0.17	100.36	3.386
A1. I	.367	.106	.055	.089	.326	.243	.011	.051			.110	.045	.002			

CLASS IV. DOFEMANE. SUBCLASS II. DOPOMIC.

RANG 2. DOMIRIC.

1	20.02	2.64	11.75	16.98	5.93	10.27	0.23	0.39	0.71	2.47	20.73	7.34	0.23	CO ₂ trace Cl 0.02 F 0.31	100.02	
A2. II	.334	.026	.073	.236	.148	.166	.004	.004			.259	.050	.003			

ORDER 5. PERMITIC. CORDILLERARE. SUBORDER 2. DOHEMIC.

SUBRANG 4. DOFERROUS. POMEROSE. (E. S. BASTIN.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	IV(V).(4)5.2''. 1(2).4''.	an 11.12 di 5.40 le 1.31 ol 2.38 ne 1.42 'cs 1.89 mt 31.55 il 25.69 hm 17.44	Pine Lake, Victoria County, Ontario.	F. J. Pope.	F. J. Pope, Tr. Am. Inst. M. E., XXIX, p. 380, 1899.	Iron ore.	In gabbro. Not in W. T.
2	IV(V).(4)5.2.1''.4.	an 10.84 di 8.64 le 0.44 ol 2.38 ne 2.56 il 15.50 MgO 2.64 FeO 4.97	Millbridge, Hastings County, Ontario.	F. J. Pope.	F. J. Pope, Tr. Am. Inst. M. E., XXIX, p. 380, 1899.	Iron ore.	In gabbro. Not in W. T.
3	IV.''5.(1)2.1''.4.	an 16.68 ol 5.02 ne 0.57 cs 0.34 mt 54.73 il 8.51 (MgFe)O 3.41 ap 0.34	Caribou, Boulder County, Colorado.	E. P. Jennings.	E. P. Jennings, Tr. Am. Inst. M. E., XLIV, p. 1054, 1913.	Iron ore.	

SUBRANG 5. PERFERROUS.

1	IV.5.(1)2.1.5.	Q 20.67 mt 59.86 C 2.20 il 10.89 cm 2.24 hm 1.28	Iron Lake, Minnesota.	J. T. Singewald.	J. T. Singewald, U. S. Bur. Min. B. 64, p. 106, 1913.	Magnetite ore.	In gabbro. MgO=MgCO ₃ . CaO=CaCO ₃ .
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ORDER 5. PERMITIC. CORDILLERARE. SUBORDER 3. TILHEMIC.

SUBRANG 4. DOFERROUS.

1	IV.5.(2)3.1.4.	an 2.22 mt 34.80 C 24.58 pf 14.55 ap 1.34 MgO 1.90 CaO 12.71	Iron Hill Area, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Iron ore.	In pyroxenite.
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ORDER 3. POLMITIC. APPALACHARE. (H. S. WASHINGTON, 1917.) SUBORDER 1. PERPYRIC.

SUBRANG 3. MAGNESIFERROUS. ROSELANDOSE. (WATSON AND TABER, 1913.)

1	IV.''II.3''.1.2.3.	Q 7.08 di 1.76 or 2.78 hy 22.94 ab 11.00 mt 16.47 an 6.95 il 19.10 ap 11.42	Roseland, Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, U. S. G. S. B. 430, p. 208, 1910.	Gabbro nelsonite.	Also in Va. G. S. B. III A, p. 140, 1913.
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ORDER 3. POLMITIC. APPALACHARE. SUBORDER 5. PEROLIC.

SUBRANG 5. PERFERROUS.

1	''IV.II.3.5.2.2.	an 12.23 ol 17.92 ne 3.12 cs 4.64 kp 16.12 il 13.53 hm 8.82 pf 2.86 ap 15.12 MgO 2.80	Beaver Creek, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Biotite iron ore.	
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ORDER 4. DOMITIC. SUBORDER 4. DOTILIC.

SUBRANG 3. MAGNESIFERROUS.

1	IV(V).II.4.4.2. 3(4).	Q 8.28 hy 14.80 or 2.22 hm 11.75 ab 2.10 il 36.33 C 1.84 ru 1.60 ap 16.80	Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, Va. G. S. B. III. A, p. 135, 1913.	Hornblende nelsonite.	Not fresh
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CLASS V. PERFEMANE. (C. I. P. W., 1902.) SUBCLASS I. P+O+M EXTREME OVER A.

RANG 1. PERMIRIC. MARICASE. (C. I. P. W., 1902.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O--	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	55.23	2.08	3.94	6.25	29.29	1.68	n. d.	n. d.	1.12		0.44				100.03	3.297
A3. III	.921	.020	.025	.087	.732	.080	—	—			.006					
2	54.64	2.52	2.10	6.76	30.01	2.51	0.18	0.15	0.58		0.75	0.04	0.25		100.49	
A2. II	.911	.025	.013	.094	.750	.045	.003	.002			.009	—	.004			

RANG 1. PERMIRIC. MARICASE.

1	53.35	1.53	30.18	trace	0.89	1.14	12.61	0.16							99.86	
A3. III	.889	.015	.188	—	.022	.020	.203	.002								

RANG 2. DOMIRIC. WEBSTERASE. (C. I. P. W., 1902.)

1	53.98	1.32	1.41	3.90	22.59	15.47	n. d.	n. d.	0.83	0.09	0.15	trace	0.21	Cr ₂ O ₃ 0.53 NiO trace	100.48	3.301
A2. II	.900	.011	.009	.054	.565	.277	—	—			.002	—	.003			
2	52.55	2.71	1.27	4.90	20.39	16.52	0.27		1.09		0.14	trace	0.24	Cr ₂ O ₃ 0.44	100.52	3.304
A2. II	.876	.022	.008	.068	.510	.295	.005				.002	—	.003			
3	55.14	0.66	3.48	4.73	26.66	8.39	0.30	n. d.	0.38		trace	0.23	0.03	Cr ₂ O ₃ 0.25 NiO 0.11	100.36	
A2. II	.919	.007	.022	.065	.667	.150	.005	—			—	.002	—			

RANG 2. DOMIRIC. WEBSTERASE.

1	53.21	1.94	1.44	7.92	20.78	13.12	0.11	0.07	0.87	0.14	0.26	trace	0.22	CO ₂ 0.10 ZrO ₂ trace FeS ₂ 0.03 Cr ₂ O ₃ 0.20 V ₂ O ₅ 0.03 NiO 0.03 BaO none SrO none	100.47	3.34
A1. I	.887	.019	.009	.110	.520	.134	.002	.001			.003	—	.003			
2	53.25	2.80	0.69	5.93	19.91	16.22	0.19	trace	0.24	0.05			0.09	Cr ₂ O ₃ 0.54 NiO 0.07	99.98	
A2. II	.888	.026	.004	.082	.498	.289	.003	—					.001			

RANG 3. CALCIMIRIC.

1	52.29	1.56	0.25	4.53	16.46	23.52	0.11	0.04	1.18		0.29		0.03		100.26	
A2. II	.872	.015	.002	.063	.412	.420	.002	—			.004		—			
2	50.70	1.61	2.02	4.89	17.82	22.45	0.15	0.04	1.16		0.29		0.05		101.18	
B2. III	.845	.016	.013	.068	.446	.401	.002	—			.004		—			

CLASS V. PERFEMANE.

RANG 1. PERMIRIC.

1	46.30	2.58	3.45	3.57	23.18	15.20	0.15		4.77	0.66	trace				99.86	
A3. III	.777	.025	.022	.050	.580	.271	.002				—					

ORDER 1. PERPOLIC. MAORARE. (C. I. P. W., 1902.) SECTION 1. PERPYRIC. CAROLINIARE. (C. I. P. W., 1902.)

SUBRANG 1. PERMAGNESIC. MARICOSE. (C. I. P. W., 1902.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	"V.1.1.1.1(2).	Q 4.98 di 2.19 an 5.60 hy 79.56 mt 5.80 il 0.91	Central Marico District, Transvaal.	J. A. L. Henderson.	J. A. L. Henderson, In. Diss. Leip., p. 39, 1898.	Enstatite pyroxenite.	In W. T., p. 367.
2	"V.1.1.1.1(2).	or 1.11 di 5.50 ab 1.57 hy 80.37 an 5.56 ol 1.46 mt 3.02 il 1.37	New Caledonia.	Boiteau.	A. Lacroix, C. R., CLII, p. 819, 1911.	Bronzite.	

SUBRANG 5. PERSODIFERROUS. SECTION 5. PERSODIC.

1	"V.1.1.1."5.5.	Q 0.36 ac 86.86 an 6.81 di 4.32 hy 0.20	Capo alla Cuculla, Corsica.	J. Deprat.	J. Deprat, B. Sv. Cb. G. Fr., XVII, No. 114, p. 47, 1906.	Aegirite inclusion in granite.	Cf. No. 1, III.4.1.5.
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SUBRANG 1. PERMAGNESIC. WEBSTEROSE. (C. I. P. W., 1902.)

1	V.1.1.2.1'.	Q 0.24 di 58.07 an 3.06 hy 34.25 mt 2.09 il 0.30 cm 0.67	Hebbville, n. Baltimore, Maryland.	T. M. Chatard.	G. H. Williams, A. G., VI, p. 42, 1890.	Websterite.	Complete in U. S. G. S. B. 148, p. 84, 1897. In W. T., p. 367.
2	"V.1.1.2".1(2).	ab 2.62 di 60.95 an 4.73 hy 22.94 ol 4.98 mt 1.86 il 0.30 cm 0.67	Hebbville, n. Baltimore, Maryland.	T. M. Chatard.	G. H. Williams, A. G., VI, p. 42, 1890.	Websterite.	Complete in U. S. G. S. B. 148, p. 84, 1897. In W. T., p. 367.
3	V.1.1."2.1'.	Q 2.16 di 30.72 ab 2.62 hy 57.76 an 0.56 mt 5.10 cm 0.45 ap 0.67	Webster, North Carolina.	E. A. Schneider.	G. H. Williams, A. G., VI, p. 44, 1890.	Websterite.	Complete in U. S. G. S. B. 148, p. 92, 1897. In W. T., p. 367.

SUBRANG 2. DOMAGNESIC. CECILOSE. (C. I. P. W., 1902.)

1	V.1.1.2."2.	or 0.56 di 48.24 ab 1.05 hy 41.95 an 4.45 ol 0.41 mt 2.09 il 0.46	Oakwood, Cecil County, Maryland.	W. F. Hillebrand.	A. G. Leonard, A. G., XXVIII, p. 159, 1901.	Websterite.	In W. T., p. 367.
2	"V.1.1.2".1(2).	ab 1.57 di 58.36 an 6.39 hy 57.76 ol 2.23 mt 0.93 cm 0.67	Bagley Creek, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 406, 1891.	Pyroxenite.	In W. T., p. 367.

SUBRANG 2. DOMAGNESIC.

1	V.1.1.3.(1)2.	an 3.61 di 88.89 ne 0.57 ol 4.74 cs 0.34 mt 0.46 il 0.61	Weresowsky-Ouwal, Iss District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. Fr. M., XXXIII, p. 354, 1910.	Pyroxenite.	
2	V.1.1(2)."3.(1)2.	an 3.89 di 81.34 ne 0.57 ol 9.27 cs 1.38 mt 3.02 il 0.61	Malai-Pokap River, Iss District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. Min. Fr., XXXIII, p. 354, 1910.	Pyroxenite.	

ORDER 1. PERPOLIC. MAORARE. SECTION 2. DOPYRIC. MARYLANDIARE. (C. I. P. W., 1902.)

SUBRANG 1. PERMAGNESIC.

1	"V.1.2.1.1'.	ab 1.05 di 53.95 an 6.39 hy 6.70 ol 21.69 mt 5.10	Garthby, Wolfe County, Quebec.	M. F. Connor.	J. A. Dresser, Can. G. S. Mem. 22, p. 31, 1913.	Pyroxenite.	
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CLASS V. PERFEMANE—Continued.

RANG 2. DOMIRIC. BALTIMORASE. (C. I. P. W., 1902.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	47.00	2.20	3.37	2.92	21.87	16.60	0.07		5.19		0.06		0.56	CO ₂ none Cr ₂ O ₃ 0.16	100.00	
A2. II	.783	.022	.021	.040	.547	.296	.001				.001		.008			

RANG 2. DOMIRIC. BALTIMORASE.

1	50.80	3.40	1.39	8.11	22.77	12.31	trace	trace	0.52		none	trace	0.17	SO ₃ trace Cl 0.24 Cr ₂ O ₃ 0.32	100.03	3.318
A2. II	.843	.033	.009	.112	.569	.219	—	—			—	—	.002			
2	45.70	2.54	5.75	6.40	19.45	18.77	0.28	0.06	1.64		0.46		0.02		101.07	
B2. III	.762	.025	.036	.089	.486	.336	.005	.001			.006		—			
3	43.20	4.50	4.80	13.52	13.92	19.88	n. d.	n. d.	0.23						100.05	
A3. III	.720	.044	.030	.188	.348	.355	—	—								

CLASS V. PERFEMANE.

RANG 1. PERMIRIC.

1	47.52	1.18	1.19	9.48	39.20	0.61	0.42		n. d.					Cr ₂ O ₃ 0.21	99.81	
A3. III	.792	.011	.008	.132	.980	.011	.007									

RANG 2. DOMIRIC. KOSWASE. (H. S. WASHINGTON, 1917.)

1	43.71	3.78	4.28	9.70	20.18	17.45	0.34	0.18	0.40		0.57		0.02		100.61	
A2. II	.729	.037	.027	.135	.505	.312	.006	.002			.007		—			

CLASS V. PERFEMANE.

RANG 1. PERMIRIC. GORDUNASE. (U. GRUBENMANN, 1908.)

1	41.43	0.04	2.52	6.25	43.74	0.55	n. d.	n. d.	4.41				none	Cr ₂ O ₃ 0.76 NiO 0.10	99.80	
A2. II	.691	—	.015	.087	1.094	.010	—	—					—			
2	42.99	1.11	1.87	5.91	43.14	0.10	0.29	0.13	4.00	0.51	trace	0.04	0.05	NiO 0.15 BaO none SrO none	100.29	3.075
A2. II	.717	.011	.012	.082	1.079	.002	.005	.001			—	—	—			
3	43.20	2.42	4.45	4.57	38.83	2.75	2.33	0.57	0.77					Cr ₂ O ₃ trace	99.89	
A3. III	.720	.024	.028	.064	.971	.049	.037	.006								
4	40.40	2.63	4.31	4.98	40.37	1.74	n. d.	n. d.	5.33	0.02	trace				99.78	3.073
A3. III	.673	.026	.027	.069	1.009		—	—			—					
5	41.57	1.36	4.04	4.92	37.13	2.71	0.73	0.38	5.90	0.43				Cr ₂ O ₃ 0.47	99.64	2.95
A3. III	.693	.013	.025	.068	.928	.048	.012	.004								
6	39.63	0.55	5.01	4.99	43.59	0.06	0.12	0.21	5.58	0.20				Cr ₂ O ₃ 0.14	100.08	2.87
A3. III	.661	.005	.031	.069	1.090	.001	.002	.002								

ORDER 1. PERPOLIC. MAORARE. SECTION 2. DOPYRIC. MARYLANDIARE—Continued.

SUBRANG 1. PERMAGNETIC.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	"V.1".2.2".1".	ab 0.52 di 59.82 an 5.84 hy 7.30 ol 16.14 mt 4.87 il 0.15	Dun Mountains, Nelson, New Zealand.	J. S. MacLaurin.	J. M. Bell, G. S. N. Z. B. 12, p. 31, 1911.	Websterite.	

SUBRANG 2. DOMAGNETIC. BALTIMOROSE. (C. I. P. W., 1902.)

1	"V.1.(1)2.2".2.	an 9.17 di 41.11 hy 34.60 ol 12.11 mt 2.09 cm 0.45	Johnnycake Road, Baltimore County, Maryland.	J. E. Whitfield.	G. H. Williams, A. G., VI, p. 41, 1890.	Pyroxenite.	Complete in U. S. G. S. B. 148, p. 83, 1897. In W. T., p. 367.
2	"V.1(2).2.2(3). (1)2.	an 0.28 di 62.52 lc 2.18 ol 17.90 ne 5.40 cs 2.75 mt 8.35 il 0.91	Near Zakharowna, Tagil, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 351, 1910.	Koswite.	
3	(IV)V.1".2(3). 2(3).2(3).	an 12.23 di 50.62 ol 21.16 cs 7.57 mt 6.96	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 119, 1902.	Koswite.	

ORDER 1. PERPOLIC. MAORARE. SECTION 3. PYROLIC. SAXONIARE. (H. S. WASHINGTON, 1917.)

SUBRANG 1. PERMAGNETIC.

1	V.1.3".1.1(2).	ab 3.67 di 1.54 an 1.11 hy 37.28 ol 54.14 mt 1.86 cm 0.30	Gaussberg, K. Wilhelm II Land, Antarctica.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (1), p. 84, 1906.	Olivine knolle in basalt.	
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SUBRANG 2. DOMAGNETIC. KOSWOSE. (J. P. IDINGS, 1903.)

1	(IV)V.1(2).3.2.2.	an 8.06 di 45.83 lc 0.87 ol 30.04 ne 1.70 cs 6.54 mt 6.26 il 1.06	Schoulpikha, Tagil, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 351, 1910.	Koswite.	
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ORDER 1. PERPOLIC. MAORARE. SECTION 4. DOMOLIC. HELVETIARE. (H. S. WASHINGTON, 1917.)

SUBRANG 1. PERMAGNETIC. GORDUNOSE. (U. GRUBENMANN, 1908.)

1	V.1.4.1.1".	di 2.19 hy 19.45 ol 68.96 mt 3.48 cm 1.12	Riddle, Douglas County, Oregon.	F. W. Clarke.	Diller and Clarke, U. S. G. S. B. 60, p. 23, 1890.	Saxonite.	In W. T., p. 369.
2	V.1.4.1.1".	or 0.56 hy 20.72 ab 2.62 ol 69.27 an 0.28 mt 2.78 C 0.31	Santa Rosa Creek, Rossland Moun- tains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 336, 1912.	Harzburgite.	Fresh.
3	"V.1.4.1.1.	lc 2.62 ac 8.78 ne 5.11 di 10.25 ol 70.19 cs 0.17 mt 2.09	Finkenberg, Rheinland.	Schmidt and Rieke.	F. Zirkel, Abh. Sächs. Ges. W., XXVIII, p. 124, 1903.	Olivine knolle in basalt.	
4	"V.1".4.1.1".	an 7.23 di 1.08 hy 17.82 ol 62.02 mt 6.26	Gotthard Tunnel, Tyrol.	L. Hezner.	A. Bodmer-Beder, N. J. B. B., XVI, p. 187, 1903.	Harzburgite.	
5	"V.1".4.1.1".	or 2.22 ac 1.39 ab 4.72 di 10.43 hy 9.53 ol 58.91 mt 5.80 cm 0.67	Gigestaffel, n. Andermatt, Switzerland.	C. Schneider.	C. Schneider, In. Diss. Zür., p. 30, 1912.	Diallage peridotite.	
6	V.1".4.1.1.	or 1.11 hy 16.36 ab 1.05 ol 68.68 an 0.28 mt 7.19	Gigestaffel, n. Andermatt, Switzerland.	C. Schneider.	C. Schneider, In. Diss. Zür., p. 30, 1912.	Diallage peridotite.	

CLASS V. PERFEMANE—Continued.

RANG 1. PERMIRIC. GORDUNASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7	40.92	1.99	3.82	4.52	39.60	1.59	0.05	0.37	6.55	0.42				Cr ₂ O ₃ 0.52	100.35	2.94
A3. III	.682	.020	.024	.063	.990	.029	—	.004								
8	41.65	1.47	2.03	6.49	42.26	1.72	n. d.	n. d.	3.82					Cr ₂ O ₃ trace	99.44	
A4. IV	.694	.014	.013	.090	1.057	.030	—	—								
9	40.77	2.13	4.03	4.48	40.38	0.71	n. d.	n. d.	6.96	0.11	trace			Cr ₂ O ₃ 0.66	100.23	2.98
A3. III	.680	.021	.025	.063	1.010	.013	—	—			—					
10	42.73	0.61	3.43	4.99	45.21	0.93	n. d.	n. d.	1.75	0.09	trace			Cr ₂ O ₃ 0.54	100.28	3.19
A3. III	.712	.006	.021	.069	1.130	.016	—	—			—					
11	42.42	1.32	4.27	6.96	40.80	1.19	0.72	0.45	0.70		0.30	0.10		S 0.04 Cr ₂ O ₃ 0.40	99.67	3.255
A2. II	.707	.012	.027	.097	1.020	.021	.012	.005			.004	.001				
12	43.76	3.31	0.97	7.29	40.67	1.53	0.21	0.09	1.19	0.27	0.06	trace	0.24	ZrO ₂ 0.02 Cl 0.11 F 0.02 S 0.03 Cr ₂ O ₃ none BaO 0.03 SrO 0.05	99.85	
A1. I	.729	.032	.006	.101	1.017	.027	.003	.001			.001	—	.003			
13	45.22	2.99	0.20	7.17	40.89	1.93	0.55	0.21	0.20	0.05	0.14	0.20	0.28	CO ₂ none Cr ₂ O ₃ 0.20 NiO 0.10 BaO none SrO 0.04	100.41	3.33
A1. I	.754	.029	.001	.100	1.022	.035	.009	.002			.002	.001	.004			

RANG 1. PERMIRIC. GORDUNASE.

1	42.39	2.26	0.35	10.47	39.19	2.33	n. d.	n. d.	1.54					Cr ₂ O ₃ 0.23	99.51	3.152
A3. III	.707	.022	.002	.146	.980	.041	—	—								

CLASS V. PERFEMANE.

RANG 1. PERMIRIC. DUNASE. (C. I. P. W., 1902.)

1	40.11	0.88	1.20	6.09	48.58	n. d.	n. d.	n. d.	2.74					Cr ₂ O ₃ 0.18 Chromite 0.56	100.34	
A4. IV	.669	.009	.007	.085	1.215	—	—	—								
2	38.40	0.29	3.42	6.69	45.23	0.35	0.08	none	4.11	0.24	none	trace	0.24	ZrO ₂ none CO ₂ 1.10 S 0.06 Cr ₂ O ₃ 0.07 NiO 0.10 BaO none SrO none	100.38	
A1. I	.640	.003	.021	.093	1.131	.006	.001	—			—	—	.003			
3	39.04	2.89	2.80	7.78	39.99	2.11	0.56	0.09	3.47	0.15	0.36		0.24	S 0.06 Cr ₂ O ₃ 0.45 NiO 0.23 CuO 0.02	100.24	
A1. I	.651	.028	.018	.108	1.000	.038	.009	.001			.005		.003			
4	38.82	2.24	3.04	4.90	44.28	none	0.20	—	5.68		none		0.28	CO ₂ 0.60 Cr ₂ O ₃ 0.28	100.32	
A2. II	.647	.021	.019	.068	1.107	—	.003				—		.004			

ORDER 1. PERPOLIC. MAORARE. SECTION 4. DOMOLIC. HELVETIARE—Continued.

SUBRANG 1. PERMAGNESIC. GORDUNOSE—Continued.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	"V.1".4.1.1.	or 2.22 di 2.81 an 4.45 hy 18.92 ol 58.75 mt 5.57 cm 0.67	Gigestellen, n. Andermatt, Switzerland.	C. Schneider.	C. Schneider, In. Diss. Zür., p. 30, 1912.	Diallage peridotite.	
8	V.1.4.1.1".	an 3.89 di 3.49 hy 15.32 ol 59.87 mt 3.02	Geisspaspas, Oberwallis, Switzerland.	Hinden.	H. Preiswerk, In. Diss. Basel, p. 16, 1901.	Dunite.	
9	V.1".4.1.1.	an 3.61 hy 26.66 C 0.82 ol 55.43 mt 5.80 cm 0.90	Loderio, Switzerland?	L. Hezner.	Cited in C. Schneider, In. Diss. Zür., p. 30, 1912.	Peridotite.	
10	V.1.4.1.1.⊙	an 1.67 di 2.16 hy 18.49 ol 70.66 mt 4.87 cm 0.67	Gorduno Valley, n. Bellinzona, Piedmont.	L. Hezner.	U. Grubenmann, Jh. Nf. Ges. Zür., L (1), p. 13, 1908.	Olivine rock (perido- tite).	
11	V.1".4".1.1".	or 2.78 ac 2.31 ab 3.67 di 3.92 hy 8.96 ol 70.72 mt 5.10 il 0.61 cm 0.62 ap 0.34	Porto Moniz, Madeira.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 407, 1912.	Olivine bomb.	
12	(IV)V.1.4.1.1".	or 0.56 hy 19.31 ab 1.57 ol 67.52 an 7.51 mt 1.39 C 0.10	Timor Island, Moluccas.	E. W. Morley.	J. P. Iddings, pers. com.		
13	(IV)V.1.4.1.1".	or 1.11 di 3.06 ab 4.72 hy 14.28 an 5.00 ol 70.72 mt 0.23 il 0.30 ap 0.34	Mount Gambier, South Australia.	E. R. Stanley.	E. R. Stanley, Tr. R. Soc. S. Aust., XXXIV, p. 65, 1910.	Lherzolite.	

SUBRANG 2. DOMAGNESIC. KAKOULIMOSE. (A. LACROIX, 1911.)

1	"V.1.4.1.(1)2.	an 6.12 di 4.16 ol 70.79 mt 0.46 cm 0.45	Goose Bay, Magellan Straits, Patagonia.	Not stated.	K. v. Krustchoff, B. Soc. M. Fr., IX, p. 14, 1886.	Peridotite.	In W. T., p. 369.
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ORDER 1. PERPOLIC. MAORARE. SECTION 5. PEROLIC. MAORIARE. (C. I. P. W., 1902.)

SUBRANG 1. PERMAGNESIC. DUNOSE. (C. I. P. W., 1902.)

1	V.1.5.1.1".	C 0.88 hy 4.60 ol 89.76 mt 1.62 cm 0.56	Corundum Hill, Macon County, North Carolina.	T. M. Chatard.	T. M. Chatard, U. S. G. S. B. 42, p. 55, 1887.	Dunite.	In W. T., p. 369.
2	V.1.5.1.1".	ab 0.52 di 0.86 an 0.56 hy 4.30 ol 83.50 mt 4.87	Tulameen River, Yale District, British Columbia.	W. F. Hille- brand.	J. F. Kemp, U. S. G. S. B. 193, p. 44, 1902	Peridotite.	In W. T., p. 369.
3	(IV)V.1".5.1.1(2).	or 0.56 di 4.38 ab 2.62 ol 77.20 an 5.00 mt 4.18 ne 1.14 il 0.76 cm 0.67	Barkevale, Rum Island, Scotland.	W. Pollard.	A. Harker, G. S. Scot., Mem., Sh. 60, p. 80, 1908.	Peridotite.	
4	V.1.4(5).1.1.	ab 1.57 hy 10.13 C 1.84 ol 73.56 mt 4.41 cm 0.45	Mount Bowen, Mikonui, New Zealand.	J. S. MacLaurin.	P. G. Morgan, G. S. N. Z. B. 6, p. 126, 1908.	Dunite.	Not fresh.

CLASS V. PERFEMANE—Continued.

RANG 1. PERMIRIC. DUNASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	39.16	1.11	2.47	11.44	43.64	0.58	0.08	0.16	0.78	0.02	0.11		0.15	CO ₂ trace S 0.04 Cr ₂ O ₃ 0.61 NiO 0.15 CuO 0.06	100.56	
A1. I	.653	.011	.015	.159	1.091	.010	.001	.002			.001		.002			
2	40.01	2.54	1.00	11.70	39.90	1.68	1.07	0.52	1.10					Cr ₂ O ₃ 0.16	99.68	
A3. III	.667	.025	.006	.163	.998	.030	.017	.006								
3	38.32	2.66	4.35	11.78	36.22	2.74	0.16	0.06	3.38		0.28	0.07		Cr ₂ O ₃ 0.16	100.18	
A2. II	.639	.026	.027	.164	.906	.049	.003	—			.004	—				

CLASS V. PERFEMANE.

RANG 2. DOMIRIC.

1	48.62	2.66	6.73	6.88	19.44	10.29	0.20	0.06	3.28	0.25	0.57	0.75	0.19	CO ₂ trace ZrO ₂ none S none Cr ₂ O ₃ 0.46 NiO 0.05 BaO none	100.43	
A1. I	.810	.026	.042	.096	.486	.184	.003	.001			.007	.005	.003			

RANG 3. CALCIMIRIC. CEBOLLASE. (H. S. WASHINGTON, 1917.)

1	40.25	2.74	10.83	7.38	12.04	20.21	0.42	none	0.46	0.46	4.76	0.45	0.16	CO ₂ 0.07 ZrO ₂ none F none S 0.02 Cr ₂ O ₃ none V ₂ O ₅ 0.04 NiO none BaO 0.03 SrO trace	100.32	
A1. I	.671	.027	.068	.103	.301	.361	.007	—			.060	.003	.002			
2	37.47	2.86	11.77	7.83	10.12	21.68	0.47	0.93	0.73	0.27	1.07	4.33	0.16	CO ₂ 0.06 ZrO ₂ none F 0.36 S 0.04 V ₂ O ₅ 0.12 BaO 0.06 SrO 0.14	100.77	
A1. I	.625	.028	.074	.108	.253	.387	.008	.010			.013	.030	.002			

CLASS V. PERFEMANE.

RANG 2. DOMIRIC.

1	31.77	none	12.97	10.23	15.77	12.20	2.69	0.54	0.60	0.05	12.97	trace	trace		99.79	3.561
A2. II	.530	—	.081	.142	.394	.218	.044	.006			.162	—	—			

CLASS V. PERFEMANE.

RANG 1. PERMIRIC. PERMASE. (H. S. WASHINGTON, 1917.)

1	31.84	1.37	15.63	14.25	33.10	0.91	n. d.	n. d.	2.49					Cr ₂ O ₃ in Al ₂ O ₃	99.59	
A4. IV	.531	.013	.098	.198	.828	.016	—	—								

CLASS V. PERFEMANE.

RANG 1. PERMIRIC.

1	26.00	0.40	35.00	32.28	1.82	2.24	n. d.	n. d.	n. d.		0.62	0.01	2.26	S none Cr ₂ O ₃ 0.01 V ₂ O ₅ trace	100.64	
B2. III	.433	.004	.219	.449							.008	—	.032			
2	24.00	0.51	35.00	32.92	1.20	2.16	n. d.	n. d.	n. d.		1.25	0.01	2.86	S 0.01 Cr ₂ O ₃ 0.06 V ₂ O ₅ trace	99.95	
B2. III	.400	.005	.219	.457							.016	—	.041			

ORDER 1. PERPOLIC. MAORARE. SECTION 5. PEROLIC. MAORIARE—Continued.

SUBRANG 2. DOMAGNESIC. GUINEOSE. (A. LACROIX, 1911.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	V.1.5.1.(1)2.	or 1.11 di 0.43 ab 0.52 ol 90.61 an 2.22 mt 3.48 il 0.15 cm 0.90	Abhuin, Rhangail, Rum Island, Scotland.	W. Pollard.	A. Harker, G. S. Scot. Mem., Sh. 60, p. 80, 1908.	Peridotite.	
2	"V.1.5.1.(1)2.	an 0.56 di 3.09 lc 2.62 ol 84.83 ne 4.83 cs 1.20 mt 1.39	Kilometer 86, Conacry-Niger R. R., French Guinea.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 114, 1911.	Dunite.	
3	"V.1".(4)5.1.(1) 2.	ab 1.57 di 5.72 an 6.39 hy 3.43 ol 72.63 mt 6.26 il 0.61	Kakoulima, French Guinea.	Boiteau.	A. Lacroix, N. Arch. Mus., III, p. 114, 1911.	Wehrlite.	

ORDER 2. DOPOLIC. SECTION 1. PERPYRIC.

SUBRANG 2. DOMAGNESIC.

1	(IV)V.(1)2.1.2. "2.	Q 3.84 di 31.74 or 0.56 hy 39.89 ab 1.57 mt 9.74 an 6.12 il 1.06 cm 0.68 ap 1.68	Honeybrook, Pennsylvania.	W. T. Schaller.	F. Bascom, U. S. G. S. rec. lab.	Pyroxenite.	
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SUBRANG 2. DOMAGNESIC. CEBOLLOSE. (H. S. WASHINGTON, 1916.)

1	"V.2.1.3.2.	an 5.56 di 65.02 ne 1.99 cs 2.58 mt 9.98 il 9.12 hm 4.00 ap 1.01	Cebolla Springs, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Pyroxenite.	
2	(IV)V.2.1.3.2.	an 2.78 di 59.49 lc 4.36 ol 0.35 ne 2.27 cs 0.43 mt 17.17 il 1.98 ap 10.08	Libby, Montana.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Apatite pyroxenite.	

ORDER 2. DOPOLIC. SECTION 3. PYROLIC.

SUBRANG 2. DOMAGNESIC.

1	V.2.3.2.2".	ac 20.33 ks 1.08 di 13.39 ol 23.24 cs 11.70 il 21.58 hm 5.92 pf 2.72	Narsak, Ilmausak, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 205, 1911.	Magnetite pyroxenite.	
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ORDER 2. DOPOLIC. SECTION 5. PEROLIC.

SUBRANG 2. DOMAGNESIC. PERMOSE. (J. P. IDDINGS, 1903.)

1	V.2.(4)5.1.2.	an 3.61 di 0.65 hy 7.06 ol 63.00 mt 22.74	Koswinsky Kamen, Ural Mountains.	Not stated.	Duparc and Pearce, Ural Nord, I, p. 128, 1902.	Dunite.	
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ORDER 3. POLMITIC. RHODARE. (C. H. WARREN, 1908.) SECTION 1. PERPYRIC.

SUBRANG 5. FERFERROUS.

1	(IV).V.3(4).1.1 .5.	Q 10.74 hy 33.53 C 0.40 mt 50.81 il 1.22	Tucker Lake, Minnesota.	J. T. Singewald.	J. T. Singewald, U. S. Bur. Min. B. 64, p. 105, 1913.	Magnetite ore.	In gabbro. MgO=Mg(CO) ₃ . CaO=CaCO ₃ .
2	"V.3(4).1.1.5.	Q 8.22 hy 34.72 C 0.51 mt 50.81 il 2.43	Tucker Lake, Minnesota.	J. T. Singewald.	J. T. Singewald, U. S. Bur. Min. B. 64, p. 105, 1913.	Magnetite ore.	In gabbro. MgO=Mg(CO) ₃ . CaO=CaCO ₃ .

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

CLASS V. PERFEMANE.

RANG 3. CALCIMIRIC. CARDINALASE. (E. S. BASTIN.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1	27.71	2.92	21.80	15.70	17.98	6.83	0.19	none	3.51	0.54	2.69	none	0.22	CO ₂ 0.22 S 0.04 CaO 0.05 BaO trace SrO trace	100.40	3.564
A1. I	.462	.028	.136	.218	.450	.121	.003	—			.034	—	.003			

CLASS V. PERFEMANE.

RANG 1. PERMIRIC.

1	28.65	2.30	21.61	15.93	20.67	3.45	0.63	0.29	3.43		2.55	trace	0.45		99.98	
A2. II	.478	.023	.135	.221	.517	.062	.010	.003			.082	—	.006			

CLASS V. PERFEMANE.

RANG 1. PERMIRIC. RHODASE. (C. H. WARREN, 1908.)

1	22.35	5.26	14.05	28.84	16.10	1.17	0.44	0.10		0.42	10.11	0.02	0.43	CO ₂ 0.02 S 0.38 Cr ₂ O ₃ trace V ₂ O ₅ 0.18 NiO 0.08 Zn 0.71 Cu 0.03 Pb trace	100.74	3.92
A1. I	.373	.052	.088	.401	.403	.021	.006	.001			.126	—	.006			

CLASS V. PERFEMANE.

RANG 1. PERMIRIC.

1	13.81	4.00	35.14	32.40	0.06	0.04	n. d.	n. d.	n. d.		8.25	trace	3.20	S none Cr ₂ O ₃ 2.05 V ₂ O ₅ 1.03	99.98	
B2. III	.200	.039	.220	.450							.103	—	.045			

CLASS V. PERFEMANE.

RANG 1. PERMIRIC.

1	8.04	0.39	88.41	2.52	0.06	0.23	0.05	0.29	0.17		0.39	trace	0.02	S 0.02	100.59	
A2. II	.134	.004	.553	.035	.002	.004	.001	.003			.005	—	—			

CLASS V. PERFEMANE.

RANG 1. PERMIRIC.

1	7.52	4.45	46.67	22.10	3.13	2.17	0.52	0.22	0.37		10.21	0.07	0.23	S 0.82 Cr ₂ O ₃ 0.11 V ₂ O ₅ 0.35 NiO 0.31 CoO 0.09	99.34	
B1. II	.125	.044	.292	.307	.078	.039	.008	.002			.127	—	.003			
2	4.08	6.40	33.43	34.58	3.89	0.65	0.29	0.15	1.32		14.25	0.02	0.45	Cr ₂ O ₃ 0.20	99.71	
A2. II	.068	.063	.209	.480	.097	.011	.005	.002			.176	—	.006			

RANG 1. PERMIRIC.

1	1.47	0.67	62.39	26.93	0.33	0.72	n. d.	n. d.	0.31		6.41	0.03	0.45	S 0.06 V ₂ O ₅ 0.23 NiO 0.22 CoO 0.05	100.27	
A2. II	.025	.006	.390	.374	.008	.013					.080		.006			

ORDER 3. POLMITIC. RHODARE. SECTION 3. PYROLIC.

SUBRANG 2. DOMAGNESIC. CARDINALOSE. (E. S. BASTIN.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	"V."3.3".(1)2.2".	ab 1.57 di 21.03 an 6.95 ol 29.69 mt 31.55 il 5.17	Caribou, Boulder County, Colorado.	G. Steiger.	E. S. Bastin, U. S. G. S. rec. lab.	Magnetite peridotite.	

ORDER 3. POLMITIC. RHODARE. SECTION 4. DOMOLIC.

SUBRANG 2. DOMAGNESIC.

1	(IV)V."3.4.1".2.	or 1.67 di 11.42 ab 5.24 hy 2.80 an 2.78 ol 36.49 mt 31.32 il 4.86	Riccoletta, Traversella Valley, Monzoni, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak. W., p. 70, 1904.	Wehrlite.	
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ORDER 3. POLMITIC. RHODARE. SECTION 5. PEROLIC.

SUBRANG 3. MAGNESIFEROUS. RHODOSE. (C. H. WARREN, 1908.)

1	(IV)V.3.5.1.3.	or 0.56 ol 47.89 ab 2.10 mt 20.42 an 5.84 il 19.15 ne 0.57 C 2.45	Iron Mine Hill, Cumberland, Rhode Island.	C. H. Warren.	Johnson and Warren, A. J. S., XXV, p. 24, 1908.	Cumber- landite.	
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ORDER 4. DOMITIC. SECTION 2. DOHEMIC.

SUBRANG 5. PERFERROUS.

1	"V.4.2.1.5.	Q 4.32 hy 20.86 C 4.00 mt 51.04 il 15.66 cm 3.14	Iron Lake, Minnesota.	J. T. Singe- wald.	J. T. Singewald, U. S. Bur. Min. B. 64, p. 106, 1913.	Magnetite ore.	In gabbro. MgO=MgCO ₃ . CaO=CaCO ₃ .
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ORDER 5. PERMITIC. SECTION 1. PERHEMIC. SUBSECTION 5. PERHEMATITIC.

SUBRANG 5. PERFERROUS.

1	V.5.1.5.1.5.	Q 6.24 di 0.43 or 1.67 wo 0.23 ab 0.52 mt 6.96 il 0.76 hm 83.68	Valerius claim, Kiruna, Lapland, Sweden.	G. Nyblom.	P. Geijer, G. Kir. Dist., p. 177, 1910.	Iron ore.	
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ORDER 5. PERMITIC. SECTION 2. DOHEMIC.

SUBRANG 4. DOFERROUS.

1	"V.5.2.1.4.	an 9.45 ol 4.34 lc 0.87 cs 0.43 ne 2.27 mt 42.46 il 19.30 hm 17.44 MgO 0.64	Newboro, Leeds County, Ontario.	F. J. Pope.	F. J. Pope, Tr. Am. Inst. M. E., XXIX, p. 380, 1899.	Iron ore.	In gabbro. Not in W. T.
2	"V.5.2(3).1.4".	an 3.06 ol 2.41 lc 0.87 mt 48.49 ne 1.42 il 26.75 C 4.59 (MgFe)O 9.58	Routivara, Sweden.	W. Petersson.	W. Petersson, G. F. F., XV, p. 49, 1893.	Magnetite spinellite.	In W. T., p. 369.

SUBRANG 5. PERFERROUS.

1	V.5.(1)2.1.5.	an 1.67 di 1.51 mt 69.60 il 12.16 hm 14.40	Eagle Lake, Frontenac County, Ontario.	F. J. Pope.	F. J. Pope, Tr. Am. Inst. M. E., XXIX, p. 380, 1899.	Iron ore.	In gabbro. Not in W. T.
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CLASS V. PERFEMANE.

RANG 1. PERMIRIC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
1	7.82	3.20	29.40	29.78	5.67	3.42	0.61	0.17	0.38		17.23	0.14	0.22	S V ₂ O ₅ NiO CoO	0.06 0.63 0.43 0.10	99.26	
B1, II	.130	.031	.184	.414	.142	.061	.010	.002			.215	—	.003				
2	1.11	6.18	39.18	30.73	4.04	n. d.	n. d.	n. d.	0.26		18.82	0.08	0.46	S NiO	0.02 0.07	100.95	
B2, III	.018	.060	.245	.427	.101						.235	—	.007				

CLASS V. PERFEMANE.

RANG 1. PERMIRIC. URBAINASE. (H. S. WASHINGTON, 1917.)

1	2.24	1.65	13.61	24.49	4.04	0.30	n. d.	n. d.	n. d.		53.35		0.30		99.98	
A2. II	.037	.015	.085	.340	.101	.005					.667		.004			
2	0.60	n. d.	22.11	31.11	3.15	0.55	n. d.	n. d.	n. d.		41.75	0.02	0.28		99.57	
A3. III	.010	—	.138	.435	.079	.010					.522	—	.004		(99.95)	

CLASS V. PERFEMANE. SUBCLASS II. DOPOMIC.

RANG 3. CALCIMIRIC.

I	8.43	0.74	19.16	13.68	5.06	19.98	0.35	0.59	0.65	0.35	24.74	5.58	0.26	CO ₂	none	100.23
A1. I	.141	.007	.120	.190	.127	.357	.006	.006			.309	.039	.004	ZrO ₂	0.01	
														Cl	none	
														F	0.19	
														S	0.04	
														Cr ₂ O ₃	none	
														V ₂ O ₅	0.20	
														NiO	0.05	
														BaO	0.05	
														SrO	0.12	

CLASS V. PERFEMANE. SUBCLASS II. DOPOMIC.

RANG 3. CALCIMIRIC.

1	1.24	n. d.	31.45	20.20	0.64	12.73	0.10	0.34	0.97	0.20	15.78	9.40	0.23	Cl F	trace 0.23	99.42	4.214
A2. II	.021	—	.197	.281	.016	.227	.002	.003			.197	.666	.003				

CLASS V. PERFEMANE. SUBCLASS II. DOPOMIC.

RANG 2. DOMIRIC.

1	1.65	n. d.	15.59	23.57	0.50	9.03	n. d.	n. d.	0.87	0.53	41.46	7.59	0.26	CO ₂ Cl F	trace trace 0.17	101.22	
B2. III	.028	—	.098	.328	.013	.161	—	—			.518	.063	.004				
2	0.70	n. d.	11.12	27.93	0.72	8.34	n. d.	n. d.	0.58	0.15	42.84	6.89	0.18	CO ₂ Cl F	trace 0.01 0.21	99.67	
A2. II	.012	—	.070	.388	.018	.149	—	—			.536	.049	.003				

ORDER 5. PERMITIC. SECTION 3. TILHEMIC.

SUBRANG 4. DOFERROUS.

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	(IV)V.(4)5."3. 1"4.	an 5.28 ol 6.28 lc 0.87 cs 3.61 ne 2.84 mt 43.38 il 32.68 MgO 2.56 FeO 0.50	Horton Township, Renfrew County, Ontario.	F. J. Pope.	F. J. Pope, Tr. Am. Inst. M. E., XXIX, p. 380, 1899.	Iron ore.	In gabbro. Not in W. T.
2	V.5.(2)3.1.4.	C 6.18 hy 1.80 mt 46.40 il 35.72 hm 7.20 MgO 3.32	Hellevig, Søndfjord, Norway.	Riley.	Cited in J. H. L. Vogt, Zs. Prakt. G., VIII, p. 236, 1900.	Titanomag- netite spinellite.	Not in W. T.

ORDER 5. PERMITIC. SECTION 4. DOTILIC. SUBSECTION 2. DOMILMENIC.

SUBRANG 4. DOFERROUS. URBAINOSE. (H. S. WASHINGTON, 1917.)

1	V.5.4(5).2"1.4.	an 1.39 ol 3.78 C 1.02 hm 13.61 il 52.29 ru 25.84 MgO 1.88	St. Urbain, n. Quebec, Quebec.	R. S. Anderson.	C. H. Warren, A. J. S., XXXIII, p. 275, 1912.	Urbainite.	
2	V.5."4.2.1.4(5).	wo 1.16 mt 32.02 il 45.75 ru 17.68 MgO 3.15	Ankershus, Ekersund, Norway.	A. Tamm.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 178.	Ilmenitite.	

ORDER 4. DOMITIC. SUBORDER 4. DOTILIC.

SUBRANG 4. MAGNESIFEROUS.

1	V.II.4.4.3.3(4).	kp 1.90 ac 2.31 ne 0.28 ol 7.14 cs 9.63 il 29.49 hm 18.40 pf 15.64 ap 13.10 MgO 1.00	Near Cebolla, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Perofskite rock.	
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ORDER 5. PERMITIC. VIRGINARE. (WATSON AND TABER, 1913.) SUBORDER 3. TILHEMIC.

SUBRANG 5. PERFERROUS.

1	V.II.5.3."3.5.	or 1.67 mt 20.18 ne 0.57 il 29.94 hm 18.08 ap 22.18 MgO 0.64 CaO 0.39	Lovington, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 125, 1913.	Magnetite nelsonite.	Not fresh.
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ORDER 5. PERMITIC. VIRGINARE. SUBORDER 4. DOTILIC.

SUBRANG 5. PERFERROUS.

1	V."II.5.4.2"5.	Q 0.90 hy 1.30 il 50.46 hm 15.59 ru 14.88 ap 17.81	Roseland, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 109, 1913.	Ilmenite nelsonite.	
2	V."II.5.4(5)."2.5.	hy 0.60 ol 0.84 il 59.44 hm 11.12 ru 11.60 ap 16.46	Roseland, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 109, 1913.	Ilmenite nelsonite.	

CLASS V. PERFEMANE. SUBCLASS II. DOPOMIC.

RANG 3. CALCIMIRIC. NELSONASE. (WATSON AND TABER, 1913.)

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
1	0.95	n. d.	3.65	7.95	0.25	11.13	n. d.	n. d.	0.35	0.21	65.90	8.14	0.26	CO ₂ Cl F S	trace none 0.34 1.61	100.74	4.073
A2. II	.016	—	.023	.111	.006	.199	—	—			.824	.057	.004				
2	0.57	n. d.	4.31	26.52	1.11	16.33	n. d.	n. d.	0.59	0.09	37.00	13.08	0.38	CO ₂ Cl F S	trace trace 0.98 1.45	102.41 .79	
B2. III	.010	—	.027	.368	.028	.291	—	—			.463	.092	.005			101.62	
3	n. d.	n. d.	2.70	29.14	0.50	16.05	n. d.	n. d.	0.03		37.68	12.48	trace	Cl F S	trace 1.03 1.17	100.78	
A3. III	—	—	.017	.404	.013	.287	—	—			.471	.087	—				

RANG 4. DOCALCIC. VIRGINASE. (WATSON AND TABER, 1913.)

1	0.67	n. d.	2.87	5.04	0.15	12.16	n. d.	n. d.	0.11	0.09	69.67	9.41		Cl F S	trace 0.70 0.34	101.21	
A2. II	.011	—	.018	.070	.004	.217	—	—			.871	.066					

CLASS V. PERFEMANE. SUBCLASS III. POMAPATIC.

RANG 4. DOCALCIC.

1	6.32	2.10	23.12	15.80	1.92	26.26	n. d.	n. d.	n. d.		4.57	16.47	0.51	CO ₂ F	trace 1.50	99.57	
A3. III	.105	.021	.145	.219	.048	.469	—	—	—		.087	.116	.006				

CLASS V. PERFEMANE. SUBCLASS III. POMAPATIC.

RANG 5. PERMIRIC.

1	n. d.	n. d.	n. d.	1.19	n. d.	21.23	n. d.	n. d.	0.97		59.30	16.15		F S	1.30 0.67	100.81	
A4. IV	—	—	—	.017	—	.379	—	—			.741	.114					

ORDER 5. PERMITIC. VIRGINARE. SUBORDER 5. PERTILIC. VIRGINORE. (WATSON AND TABER, 1913.)

SUBRANG 5. PERFERROUS. NELSONOSE. (WATSON AND TABER, 1913.)

No.	Symbol.	Norm.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	V.II.5.5.3(4).5.	hy 1.92 il 12.16 hm 3.16 ru 59.52 ap 19.15 pr 3.00	Roseland, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 120, 1913.	Rutile nelsonite.	
2	V.II.5.5."3.5.	hy 1.00 il 53.35 hm 4.31 ru 8.96 ap 30.91 pr 2.64 MgO 0.72	Rose's mill, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 109, 1913.	Ilmenite nelsonite.	
3	V.II.5.5."3.5.	il 58.67 hm 2.70 ru 6.80 pr 2.16 ap 29.23	Rose's Mill, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. 430, p. 208, 1910.	Ilmenite nelsonite.	Also in Va. G. S. B. III A, p. 109, 1913.

SUBRANG 5. PERFERROUS. VIRGINOSE. (WATSON AND TABER, 1913.)

1	V.II.5.5.4(5).5.	hy 1.32 il 9.58 hm 2.87 ru 64.64 ap 22.18	Rose's mill, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III A, p. 120, 1913.	Rutile nelsonite.	
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ORDER 5. PERMITIC. SUBORDER 2. DOHEMIC.

SUBRANG 2. DOCALCIC.

1	V."III."5.2.(3) 4."2.	Q 0.90 an 5.84 hy 4.80 mt 32.02 il 13.22 hm 1.12 ap 38.98	Alnö, Sweden.	P. J. Holm- quist.	A. G. Högbom, Afh. Sv. G. Und., No. 148, p. 56, 1895.	Magnetite- apatite rock.	Not in W. T.
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ORDER 5. PERMITIC. SUBORDER 5. PERTILIC.

SUBRANG 5. PERFERROUS.

1	V.(II)III.5.5.5.5.	il 2.58 ru 57.92 ap 38.30	Rose's mill, Nelson County, Virginia.	W. M. Thorn- ton.	Watson and Taber, Va. G. S. B. III, p. 208, 1913.	Rutile nelsonite.	
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PART II.—INCOMPLETE ANALYSES OF FRESH ROCKS.

GRANITE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 A3. III	67.76	14.00	n. d.	5.18	1.00	4.28	5.22	1.19	1.01		0.46	0.19	trace		100.29	2.709
2 A4. IV	62.54	14.79	n. d.	8.49	2.08	1.49	6.27	1.12	3.51						100.29	
3 A4. IV	74.78	14.56	3.04	n. d.	trace	0.69	6.02	0.59	0.42						100.10	2.64
4 A3. III	72.97	14.63	n. d.	1.73	0.27	1.48	3.28	5.18	0.33				0.10	CO ₂ S none 0.03	100.00	
5 A4. IV	69.56	15.38	2.65	n. d.	trace	1.76	5.38	4.31	1.02						100.06	
6 A4. IV	76.52	12.21	n. d.	2.66	0.13	0.79	2.86	4.68	0.41						100.26	2.633
7 A4. IV	69.47	17.50	2.30	n. d.	0.31	2.57	3.01	4.07	0.74	0.08			trace	S 0.04	100.09	
8 A4. IV	69.33	14.33	n. d.	3.60	2.44	3.21	2.70	2.67	1.22			0.10			99.60	
9 A4. IV	66.92	18.19	3.05	n. d.	1.26	4.95	3.83	2.02	0.46						100.68	
10 A4. IV	66.31	18.27	2.51	n. d.	1.22	2.91	3.69	4.09	0.62						99.61	
11 A4. IV	76.54	13.82	1.62	n. d.	0.01	0.85	4.32	2.31	0.20						99.67	
12 A4. IV	69.34	17.25	2.46	n. d.	1.18	3.43	4.33	0.71	1.17						99.87	
13 A3. III	73.65	14.28	2.65	n. d.	0.81	1.28	2.51	3.95	0.65			0.15	trace	Cl 0.05	99.98	
14 A3. III	68.01	17.34	3.66	n. d.	0.77	2.06	2.05	4.41	0.64		0.83	0.41		Cl 0.07	100.25	
15 A4. IV	70.48	14.24	3.72	n. d.	0.40	1.48	3.66	4.26	1.59						99.83	
16 A4. IV	68.60	16.15	n. d.	2.93	0.66	2.35	5.54	3.34	1.04				trace		100.58	
17 A3. III	69.30	14.40	n. d.	3.02	1.94	2.97	3.30	4.15	1.00		0.84	0.13			100.92	
18 A3. III	67.50	15.65	n. d.	2.43	1.70	1.77	2.95	4.08	3.20		0.26				99.54	
19 A4. IV	70.84	14.53	2.46	n. d.	1.17	1.45	3.04	5.12	1.71						100.32	
20 A4. IV	71.04	15.00	n. d.	2.93	0.39	1.90	3.99	4.59	0.48				trace		100.32	

GRANITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Whitson Lake, near Sudbury, Ontario.	T. L. Walker.	T. L. Walker, Q. J. G. S., LIII, p. 56, 1897.	Granite.	In W. T., p. 225.
2	Lost Lake, Gowganda Lake, District, Ontario.	N. L. Turner.	N. L. Bowen, J. G., XVIII, p. 667, 1910.	Granophyre.	
3	Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXVI, p. 343, 1900.	Aplite.	In W. T., p. 157.
4	Jonesboro, Washington County, Maine.	Ricketts and Banks.	T. N. Dale, U. S. G. S. B. 313, p. 170, 1907.	Granite.	
5	Barre, Vermont.	W. C. Day.	W. C. Day, U. S. G. S. A. R. 19, VI, p. 224, 1898.	Granite.	In W. T., p. 373.
6	Milford, Massachusetts.	R. C. Sweetzer.	T. N. Dale, U. S. G. S. B. 354, p. 88, 1908.	Granite.	
7	Chester, Massachusetts.	Not stated.	W. C. Day, U. S. G. S. A. R. 18, V, p. 965, 1897.	Granite.	In W. T., p. 373.
8	Near Pierce's mill, Broad Branch, District of Columbia.	R. L. Packard.	G. H. Williams, U. S. G. S. A. R. 15, p. 672, 1895.	Granite.	In W. T., p. 373.
9	Grantville, Coweta County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9A, p. 90, 1902.	Granite.	
10	Camak, Warren County, Georgia.	T. L. Watson.	T. L. Watson, J. G., IX, p. 119, 1901.	Granite.	
11	Granite Heights, near Wausau, Wisconsin.	W. W. Daniells.	E. R. Buckley, G. S. Wisc. B. IV, p. 136, 1898.	Granite.	In W. T., p. 137.
12	Saganaga Lake, Minnesota.	A. D. Meeds.	U. S. Grant, G. S. Minn. A. R. 21, p. 43, 1893.	Granite.	In W. T., p. 193.
13	Ardclach, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VIII (1), p. 54, 1901.	Granite.	
14	Ruthrie, Aberlour, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VIII (1), p. 54, 1901.	Granite.	
15	Barnavave, Carlingford, Ireland.	S. Haughton.	W. J. Sollas, Tr. R. Ir. Ac., XXX (XI), p. 491, 1894.	Granite.	In W. T., p. 167.
16	Cevins, Isere Valley, France.	E. Ritter.	E. Ritter, B. Sv. Ct. G. Fr., IX, No. 60, p. 30, 1897.	Protogine.	Not in W. T.
17	Les Halles, Lyonnais, France.	Pisani.	A. Michel-Levy, C. R., CLVI, p. 718, 1913.	Granite.	
18	Violay, Lyonnais, France.	Pisani.	A. Michel-Levy, C. R., CLVI, p. 718, 1913.	Microgranulite.	
19	Pelvoux, Dauphiny, France.	Rüst.	P. Termier, B. Soc. G. Fr., XXVII, p. 404, 1899.	Granite.	Not in W. T.
20	Mont Blanc, France.	E. Ritter.	E. Ritter, B. Sv. Ct. G. Fr., IX, No. 60, p. 30, 1897.	Protogine.	Not in W. T.

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
21 A4. IV	72.10	15.80	2.71	n. d.	1.27	1.99	3.10	3.12	0.50						100.59	
22 A4. IV	70.54	14.77	3.70	n. d.	0.36	1.68	4.66	4.82	0.44						99.97	
23 A4. IV	73.06	14.46	n. d.	2.35	0.14	0.92	3.27	5.15	1.17						100.52	
24 A3. III	70.08	13.14	n. d.	4.24	0.94	2.92	2.93	3.94	1.00		0.76	0.11	0.12		100.18	
25 A3. III	70.05	14.78	n. d.	3.37	0.44	3.42	3.10	4.13	0.42		0.19		0.22		100.12	
26 A3. III	55.72	21.35	n. d.	8.81	0.63	5.10	5.71	1.23	0.46		0.57		0.36		99.94	
27 A4. IV	56.97	20.96	n. d.	3.28	0.77	6.58	6.63	2.91	1.96		0.68				100.52	
28 A4. IV	70.90	14.32	2.96	n. d.	0.49	0.84	4.16	5.72	0.45	0.10			trace	SO ₃ trace	99.94	
29 A4. IV	70.57	16.13	3.52	n. d.	0.99	1.79	2.48	3.74	0.87						100.09	
30 A4. IV	66.88	17.89	3.75	n. d.	1.53	1.44	3.55	3.77	1.93					CO ₂ 0.08	100.82	2.68
31 A3. III	74.32	10.66	5.31	n. d.	trace	0.50	2.14	5.77	0.35		0.64		0.06	FeS ₂ 0.06	99.81	
32 A3. III	72.61	13.64	2.81	n. d.	0.60	2.04	3.27	4.82	0.58		0.18	0.12			100.62	2.652
33 A4. IV	69.66	16.98	2.54	n. d.	0.83	1.66	3.95	4.41	0.55					BaO 0.02	100.58	
34 A4. IV	68.58	15.67	2.95	n. d.	1.17	2.10	2.36	5.01	1.30			0.40			99.54	
35 A4. IV	54.73	14.02	2.34	4.92	7.40	10.20	2.98	2.67	1.23		trace	trace			100.49	
36 A4. IV	71.31	15.31	3.82	n. d.	trace	1.68	4.08	3.57	0.40	0.43		trace		Cl S 0.14 none	100.74	
37 A3. III	72.00	12.96	1.98	n. d.	0.41	1.12	5.85	4.06	0.20		1.56		0.30		100.44	

QUARTZ PORPHYRY.

1 A4. IV	77.30	11.08	3.91	n. d.	0.45	0.68	3.44	3.22	0.28						100.36	2.64
2 A4. IV	67.77	17.57	n. d.	1.59	0.49	0.51	6.20	4.56	1.47	0.73					100.89	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
21	Querigut, Pyrenees.	Pisani.	A. Lacroix, B. Sv. Ct. G. Fr., XI, No. 71, p. 31, 1900.	Granite.	In W. T., p. 135.
22	Løken, Holmestrand, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 57, 1890.	Aegirite granite.	In W. T., p. 167.
23	Bejby, Sweden.	Gerhard.	Gerhard, In. Diss. Leip., 1887.	Granitite.	Osann, II, p. 14.
24	Tappan, Grangesberg, Sweden.	A. Grabe.	H. Johansson, G. F. F., XXXII, p. 280, 1910.	Granulite (granite).	
25	Kortfors, Orebro, Sweden.	H. Santesson.	H. Bäckström, G. F. F., XVI, p. 108, 1894.	Kugel granite.	In W. T., p. 167.
26	Kortfors, Orebro, Sweden.	H. Santesson.	H. Bäckström, G. F. F., XVI, p. 108, 1894.	Kugel in granite.	In W. T., p. 409.
27	Slattmossa, Sweden.	H. Bäckström.	H. Bäckström, G. F. F., IX, p. 360, 1887.	Orbicular granite.	In W. T., p. 377.
28	Kullorberg, Pitkäranta, Finland.	A. Poehl.	O. Trüstedt, B. C. G. Fin., No. 19, p. 58, 1907.	Granite.	
29	Near-Karppi, Orivesi, Finland.	H. Berghell.	J. J. Sederholm, B. C. G. Fin., No. 6, p. 151, 1897.	Granite.	In W. T., p. 135.
30	Lamersdorf, n. Aachen, Rheinland.	F. H. Hatch.	A. v. Lasaulx, Ref. N. J., I, p. 53, 1886.	Granite.	In W. T., p. 169.
31	Hagendorf, near Waidhaus, Bayrischewald.	Not stated.	K. W. v. Gümbel, G. v. Bayern, II, p. 436, 1894.	Granite.	Not in W. T.
32	Schwarzbrunn, Gablonz, Bohemia.	R. Reinisch.	R. Reinisch, T. M. P. M., XXV, p. 536, 1906.	Granite.	
33	Karlsbad, Bohemia.	A. Schwager.	A. Schwager, Geog. Jhft. Cas., VII, p. 69, 1895.	Granite.	In W. T., p. 169.
34	Adalbertus Rock, Bohemia.	Not stated.	J. E. Hibsich, T. M. P. M., XV, p. 209, 1896.	Granitite.	In W. T., p. 169.
35	Topla, Carinthia.	H. V. Graber.	H. V. Graber, Jb. G. R.-A. Wien, XLVII, p. 278, 1897.	Concretion in granite.	TiO ₂ n. d. Cl. No. 275, I.4.2.3. In W. T., p. 323.
36	Castlemaine Goldfield, Victoria.	P. G. W. Bayley.	J. W. Gregory, G. S. Vict. Mem. 2, p. 34, 1903.	Granite.	
37	Snares Island, New Zealand.	B. C. Aston.	B. C. Aston, Subant. Islids., II, p. 769, 1909.	Granite.	

QUARTZ PORPHYRY.

1	Rigaud Mountain, Quebec.	O. E. LeRoy.	O. E. LeRoy, B. G. S. A., XII, p. 389, 1901.	Quartz porphyry.	
2	Preston, Black Hills, South Dakota.	J. Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 277, 1899.	Quartz porphyry.	

QUARTZ PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3 A4. IV	71.10	17.80	2.57	n. d.	1.02	0.94	2.32	3.72	1.20	—					100.67	
4 A4. IV	64.50	18.10	4.12	n. d.	2.07	0.99	2.15	5.35	3.39						100.38	
5 A3. III	74.66	11.49	2.02	n. d.	0.10	0.44	1.69	8.68	0.74			0.07	0.08		99.97	2.598
6 A4. IV	65.82	15.94	5.06	n. d.	trace	1.65	3.54	6.17	1.85				trace		100.03	2.68
7 A4. IV	75.04	13.12	2.12	n. d.	0.34	0.40	2.44	6.32	0.76						100.54	
8 A4. IV	74.64	14.64	1.12	n. d.	0.72	1.01	2.36	4.01	2.12						100.62	
9 A4. IV	74.56	13.52	2.04	n. d.	0.44	0.32	3.48	4.94	0.64						99.94	
10 A4. IV	71.84	16.32	3.32	n. d.	0.52	0.36	2.13	4.32	1.48						100.29	
11 A4. IV	64.08	19.52	4.24	n. d.	1.84	3.40	2.52	3.16	1.76						100.52	
12 A3. III	71.58	13.01	3.13	n. d.	1.14	1.81	3.33	3.63	1.07		0.83				99.53	2.64

RHYOLITE.

1 A3. III	72.85	12.92	2.98	n. d.	0.38	0.90	7.08	3.01	0.65			none	none		100.77	
2 A3. III	71.10	11.39	5.33	n. d.	1.54	0.08	3.95	6.37	0.44		0.57	0.05			100.82	
3 A4. IV	73.07	11.78	2.30	n. d.	0.39	2.02	1.19	6.84	2.24						99.83	
4 A4. IV	73.16	11.97	2.23	n. d.	1.08	2.67	3.55	4.56	0.16			0.18			99.56	2.359
5 A4. IV	73.81	13.72	1.59	n. d.	0.23	0.61	5.29	4.09			0.97				100.31	
6 A3. III	73.40	12.90	3.70	n. d.	0.14	2.35	3.83	2.99	0.43		0.43				100.17	
7 A3. III	72.15	13.50	3.12	n. d.	0.16	0.93	4.20	4.54	0.85		0.45				99.90	
8 A4. IV	69.81	13.85	3.21	n. d.	0.43	1.38	5.56	4.40			1.06				99.70	
9	68.40	16.89	2.95	n. d.	trace	1.50	4.25	3.98	1.94						99.91	

QUARTZ PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	Villetelle, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Porphyry.	
4	La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Quartz porphyry.	
5	Gross Umstadt, Hesse.	Not stated.	C. Vogel, Abh. G. L.-A. Hes., II, p. 49, 1891.	Quartz porphyry.	In W. T., p. 145.
6	Miekinia, near Cracow, Galicia.	R. Zuber.	R. Zuber, Jb. G. R.-A. Wien., XXXV, p. 750, 1885.	Quartz porphyry.	In W. T., p. 169.
7	Brinzio, Lake Lugano, Lombardy.	A. Schwager.	K. v. Gümbel, Geog. Jhft., VII, p. 71, 1894.	Porphyry.	Not in W. T.
8	Maroggio, Lake Lugano, Lombardy.	A. Schwager.	K. v. Gümbel, Geog. Jhft., VII, p. 71, 1894.	Porphyry.	Not in W. T.
9	Figino, Lake Lugano, Lombardy.	A. Schwager.	K. v. Gümbel, Geog. Jhft., VII, p. 71, 1894.	Porphyry.	Not in W. T.
10	Bissone, Lake Lugano, Lombardy.	A. Schwager.	K. v. Gümbel, Geog. Jhft., VII, p. 71, 1894.	Porphyry.	Not in W. T.
11	Bissone, Lake Lugano, Lombardy.	A. Schwager.	K. v. Gümbel, Geog. Jhft., VII, p. 70, 1894.	Porphyry.	Not in W. T.
12	Fosso Mar di Capvisi, Elba Island.	P. Aloisi.	P. Aloisi, Mem. Soc. Tosc., XXVI, p. 17, 1910.	Granite porphyry.	

RHYOLITE.

1	Neponset Valley, Massachusetts.	W. H. Walker.	F. Bascom, J. Ac. Sc. Phil., XV, p. 144, 1912.	Soda rhyolite.	
2	Fort Davis, Apache Mountains, Texas.	Not stated.	A. Osann, T. M. P. M., XV, p. 447, 1895.	Liparite.	In W. T., p. 221.
3	McClellan Peak, Washoe, Nevada.	F. A. Gooch.	Hague and Iddings, U. S. G. S. B. 17, p. 33, 1885.	Rhyolite.	In W. T., p. 131.
4	Filo de los Corrales, Guamani Volcano, Ecuador.	Tietze.	E. Esch in W. Reiss, Ecuador, I, p. 77, 1901.	Obsidian.	
5	Randhofsafjöll, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 657, 1891.	Liparite.	In W. T., p. 155.
6	Hlidhartfjall, Myvatn, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 663, 1891.	Obsidian.	In W. T., p. 179.
7	Mafalidh, Snäffels Peninsula, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 651, 1891.	Granophyre.	In W. T., p. 151.
8	Domadalshraun, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 643, 1891.	Liparite.	In W. T., p. 155.
9	Maskordshnur, Iceland.	C. W. Schmidt.	C. W. Schmidt, Z. D. G. G., XXXVII, p. 744, 1885.	Liparite.	In W. T., p. 167.

RHYOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
10 A4. IV	67.91	15.17	3.92	n. d.	0.55	1.59	5.36	4.52			0.53				99.55	
11 A3. III	66.55	16.35	4.00	n. d.	0.38	1.34	5.40	4.97	0.40		0.66				100.05	
12 A3. III	80.50	11.32	1.74	n. d.	0.69	1.39	1.98	0.57	0.55	0.20		0.83		SrO 0.20	99.97	2.68
13 A4. IV	72.79	13.77	3.32	n. d.	0.62	1.94	4.12	2.99	1.08				trace		100.63	
14 A4. IV	72.50	11.53	2.06	n. d.	2.72	1.79	3.37	5.24	0.70						99.91	
15 A4. IV	72.65	10.82	2.30	n. d.	0.65	0.79	5.42	6.96	0.84						100.43	
16 A3. III	73.00	14.45	n. d.	3.12	0.82	3.30	1.70	3.18	0.70		trace	trace	trace	CO ₂ trace. B ₂ O ₃ trace. SO ₃ trace. Cl trace. Li ₂ O trace.	100.27	2.76
17 A4. IV	69.90	14.73	n. d.	2.90	0.72	1.91	4.30	3.01	2.10						99.57	
18 A4. IV	74.53	13.60	2.18	n. d.	0.28	1.03	3.43	4.56	0.38						99.99	
19 A4. IV	74.37	12.65	2.58	n. d.	0.20	1.22	3.87	4.57	0.22	0.02					99.70	
20 A4. IV	72.19	12.56	3.65	n. d.	0.85	2.52	4.41	3.35	0.40	0.08					100.01	
21 A3. III	69.53	15.45	5.08	n. d.	0.04	0.73	3.70	4.24	0.86		0.16				99.79	
22 A4. IV	72.98	14.22	2.86	n. d.	0.33	1.35	1.88	5.61	0.89						100.12	
23 A4. IV	73.46	12.47	3.64	n. d.	trace	0.32	5.63	4.03	0.44				trace		99.99	
24 A4. IV	79.92	5.61	3.38	n. d.	0.04	2.45	0.30	1.19	7.38				trace		100.27	
25 A4. IV	73.70	4.99	6.08	n. d.	0.10	4.20	5.20	4.83	0.55						99.65	2.47
26 A4. IV	71.65	11.96	6.62	n. d.	2.09	3.03	1.76	2.40					0.16		99.67	2.47
27 A3. III	73.37	9.69	4.48	n. d.	0.37	1.14	4.38	5.91	0.58		0.08			CO ₂ none	100.00	
28 A3. III	72.50	10.67	4.16	n. d.	0.52	1.58	3.38	4.72	2.40		0.07			CO ₂ none	100.00	

RHYOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	Laugahraun, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 646, 1891.	Obsidian	In W. T., p. 155.
11	Hvituskridhur, Snäffelsjökull, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 659, 1891.	Liparite.	In W. T., p. 195.
12	Nant-y-benslog, Carnarvonshire, Wales.	H. W. Greenwood.	C. B. Travis, Pr. Liverp. G. Soc., X (5), p. 315, 1909.	Rhyolite.	
13	Caderidris, Wales.	T. H. Holland.	Cole and Jennings, Q. J. G. S., XLV, p. 435, 1889.	Eurite.	In W. T., p. 385.
14	Tormore, Arran, Scotland.	M. M. Tait.	J. W. Judd, Q. J. G. S., XLIX, p. 558, 1893.	Felsite.	In W. T., p. 387.
15	Jesenje, Croatia.	Not stated.	Kispatic, Schr. Sudslav. Ac., 1909, p. 177.	Liparite.	Osann, III (1), p. 147.
16	Torniella, Roccastrada, Grosseto, Tuscany.	R. V. Matteucci.	R. V. Matteucci, B. Soc. G. It., X, p. 677, 1891.	Nevadite.	In W. T., p. 141.
17	Vincenzo, Campiglia Marittima, Tuscany.	C. Dalmer.	C. Dalmer, N. J., 1887, II, p. 213.	Quartz trachyte.	In W. T., p. 181.
18	Cannetello, Lipari, Aeolian Islands.	F. Glaser.	A. Bergeat, Abh. Bay. Ak. W., XX, p. 118, 1899.	Obsidian.	In W. T., p. 171.
19	Forgia Vecchia, Lipari, Aeolian Islands.	F. Glaser.	A. Bergeat, Abh. Bay. Ak. W., XX, p. 111, 1899.	Obsidian.	In W. T., p. 153.
20	Basiluzzo, Aeolian Islands.	F. Glaser.	A. Bergeat, Abh. Bay. Ak. W., XX, p. 61, 1899.	Obsidian.	In W. T., p. 181.
21	Calasetta, San Antioco, Sardinia.	A. Johnsen.	A. Johnsen, Abh. Pr. Ak. W., Anh. 2, p. 45, 1912.	Liparite.	Also in N. J. Cb., p. 738, 1912.
22	Ben Kassem, near Menerville; Algeria.	Not stated.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, p. 26, 1900.	Liparite.	In W. T., p. 133.
23	Amba Subhat, Abyssinia.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 262, 1900.	Grogrudite.	In W. T., p. 155.
24	Near Livan, Persia.	V. Steinecke.	V. Steinecke, Zs. Ges. Nw. Halle (4), VI, p. 70, 1887.	Pitchstone.	In W. T., p. 125.
25	Wimmersa, Victoria.	J. C. Newberry.	R. H. Walcott, Pr. R. Soc. Vict., XI, p. 30, 1898.	Obsidian "bomb."	Meteoritic? Not in W. T.
26	Kalgoorlie, Western Australia.	E. S. Simpson.	E. S. Simpson, W. Aust. G. S. B. 6, p. 80, 1902.	"Obsidianite."	Meteoritic?
27	Waiarewu Creek, Whangaroa, New Zealand.	J. S. MacLaurin.	Bell and Clarke, G. S. N. Z. B. 8, p. 73, 1909.	Obsidian.	
28	Putahi Hill, Whangaroa, New Zealand.	J. S. MacLaurin.	Bell and Clarke, G. S. N. Z. B. 8, p. 73, 1909.	Rhyolite.	

QUARTZ DIORITE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 A4. IV	56.69	15.48	6.22	n. d.	6.53	7.59	3.41	3.43			0.62				99.97	
2 A4. IV	65.20	16.25	5.45	n. d.	1.87	7.55	2.87	0.50	0.65						100.34	
3 A4. IV	70.33	15.59	3.05	n. d.	1.30	3.05	4.50	1.29			1.09				100.20	
4 A4. IV	64.35	15.46	7.50	n. d.	0.50	3.58	3.28	3.54			1.63				99.84	
5 A4. IV	62.80	12.94	10.57	n. d.	2.79	4.99	2.52	1.27	1.13		1.10				100.11	2.83
6 A3. III	64.02	14.40	n. d.	8.98	3.65	4.46	3.00	0.39			0.81	0.30			100.01	
7 A4. IV	78.97	1.79	8.14	n. d.	2.11	0.68	0.40	2.61	2.68	3.00		trace		CO ₂ S trace 0.22	100.60	
8 A4. IV	70.22	14.88	3.10	n. d.	0.86	2.08	6.56	1.66	0.88				0.25		100.46	
9 A4. IV	66.00	17.35	2.57	n. d.	0.94	2.40	6.54	0.76	2.48				0.60		99.64	
10 A4. IV	65.22	16.47	6.21	n. d.	2.07	4.10	3.25	0.62	1.40				0.24		99.58	
11 A4. IV	63.04	17.65	5.41	n. d.	1.43	4.46	5.47	1.20	0.84				0.85		100.35	

DACITE.

[illegible]

QUARTZ DIORITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Three Rivers, Belchertown, Massachusetts.	W. Orr, jr.	B. K. Emerson, U. S. G. S. Mon. 29, p. 336, 1898.	Tonalite.	In W. T., p. 407.
2	Monte Santo, Sao Paulo, Brazil.	J. Machado.	J. Machado, T. M. P. M., IX, p. 355, 1888.	Quartz diorite.	In W. T., p. 407.
3	Farsund, n. Lister, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 113.	Hypersthene adamellite.	In W. T., p. 191.
4	Dypvik, n. Farsund, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., 1896, No. 5, p. 123.	Banatite.	In W. T., p. 407.
5	Mesoncles, Valsavaranche, Graian Alps, Piedmont.	G. Aichino.	V. Novarese, B. C. G. It., XXV, p. 286, 1894.	Quartz diorite.	In W. T., p. 407.
6	Ravin de Grottica, n. Corte, Corsica.	J. Deprat.	J. Deprat, B. Soc. G. Fr. (4), V, p. 762, 1905.	Quartz diorite.	
7	Bolejevici, Montenegro.	G. Manasse.	G. Manasse, Mem. d'Achi., p. 88, 1903.	Quartz diorite.	Altered.
8	Dshugdshura Mountains, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 54, 1904.	Granite-diorite.	
9	Wangatschan River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 54, 1904.	Granite-diorite.	
10	Lantar River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 54, 1904.	Granite-diorite.	
11	Wangatschan River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 54, 1904.	Granite-diorite.	

DACITE.

1	Lassen Peak, California.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 150, p. 218, 1898.	Dacite.	In W. T., p. 177.
2	Lassen Peak, California.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 150, p. 218, 1898.	Dacite.	In W. T., p. 417.
3	McClellan Peak, Washoe, Nevada.	F. A. Gooch.	Hague and Iddings, U. S. G. S. B. 17, p. 33, 1885.	Dacite.	In W. T., p. 167.
4	South Hill, Eureka District, Nevada.	R. W. Mahon.	A. Hague, U. S. G. S. Mon. 20, p. 264, 1892.	Dacite.	Not in W. T.
5	Alausi, Ecuador.	J. Siemiradzki.	J. Siemiradzki, N. J. B. B., IV, p. 209, 1886.	Dacite.	In W. T., p. 123.
6	Cerro Quimsa Chata, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 311, 1888.	Quartz andesite.	In W. T., p. 417.
7	Ferrieres, Esterel, France.	C. Rüst.	A. Michel-Levy, B. Sv. Ct. G. Fr., No. 97, p. 27, 1897.	Quartz porphyry (dacite).	In W. T., p. 167.
8	Kastro, Lemnos Island, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 223, 1898.	Quartz andesite.	Not in W. T.

DACITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9 A4. IV	63.00	17.70	3.72	n. d.	1.75	2.78	2.53	3.60	4.70						99.78	
10 A4. IV	67.62	15.93	4.37	n. d.	1.33	4.44	3.18	2.87	0.99						100.73	
11 A4. IV	66.55	15.61	2.42	n. d.	0.51	3.49	2.89	4.29	4.81						100.57	

SYENITE.

1 A4. IV	56.62	16.33	trace	4.21	7.65	5.12	4.34	2.68	2.70		0.26				99.91	
2 A4. IV	63.02	14.87	6.53	n. d.	0.95	1.12	5.85	5.62	1.45				0.46		99.87	
3 A4. IV	64.63	18.15	3.05	n. d.	0.50	1.54	5.80	4.79	1.08				1.00		100.54	
4 A4. IV	68.00	16.49	2.70	n. d.	none	1.32	7.48	3.45	0.76						100.20	
5 A3. III	66.13	17.40	2.19	n. d.	0.04	0.81	5.28	5.60	1.22		0.74		0.13		99.54	
6 A3. III	63.20	17.45	3.60	n. d.	0.75	1.40	6.90	5.88	0.50		0.46				100.14	
7 A4. IV	61.03	18.63	3.66	n. d.	1.04	1.56	7.68	5.57	0.41						99.58	
8 A4. IV	60.45	20.14	3.80	n. d.	1.27	1.68	7.23	5.12	0.71						100.40	
9 A3. III	55.39	14.14	11.64	n. d.	3.21	3.99	3.17	2.99	3.42		1.86		CO ₂ trace		99.81	
10 A4. IV	61.97	15.11	6.95	n. d.	4.05	2.87	4.01	2.43	2.98				CO ₂ 0.08		100.45	
11 A4. IV	59.46	20.18	4.17	n. d.	0.82	2.83	5.13	6.65	0.55						99.79	

TRACHYTE.

1 A4. IV	62.28	19.17	3.39	n. d.	trace	1.44	5.37	5.93	2.33						99.91	2.648
2 A4. IV	63.89	15.08	4.63	n. d.	1.06	9.00	1.00	3.95	1.45						100.06	2.702
3 A4. IV	64.38	16.98	4.04	n. d.	0.28	1.08	7.57	4.30	1.64						100.27	
4 A3. III	56.41	16.42	8.60	0.02	2.55	1.83	2.56	9.65	0.21		1.17		0.28	CO ₂ 0.33	100.03	

DACITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	Mount Athanasios, Lemnos Island, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 223, 1898.	Dacite.	Not in W. T.
10	Dra zeg Etter, Menerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, p. 129, 1900.	Dacite.	In W. T., p. 185.
11	Cap Blanc, Menerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, p. 59, 1900.	Dacite.	In W. T., p. 185.

SYENITE.

1	Wataybeeg Lake, Abitibi Region, Ontario.	A. G. Burrows.	G. F. Kay, Rep. Bur. Min. Ont., XIII, p. 118, 1904.	Hornblende syenite.	
2	Beekmantown, Clinton County, New York.	E. W. Morley.	H. P. Cushing, B. G. S. A., IX, p. 248, 1898.	Syenite porphyry.	In W. T., p. 389.
3	Fourche Mountain, Arkansas.	R. N. Brackett.	J. F. Williams, Ign. R. Ark., p. 96, 1890.	Quartz syenite.	MnO high? In W. T., p. 201.
4	Lake Borolan, Sutherland, Scotland.	Not stated.	J. Shand, N. J. B. B., XXII, p. 417, 1906.	Quartz syenite.	
5	Between Thinghould and Fjelebua, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Quartz syenite.	In W. T., p. 195.
6	Tonsenas, near Christiania, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 54, 1890.	Nordmarkite.	In W. T., p. 197.
7	Aueröd, near Holmestrand, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 57, 1890.	Nordmarkite.	In W. T., p. 211.
8	Aueröd, near Holmestrand, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 54, 1890.	Nordmarkite.	In W. T., p. 203.
9	Rotmurg, Wurttemberg.	Not stated.	K. Regelman, Erl. G. Kt. Wurt., Bl. 91, p. 39, 1907.	Hornblende syenite.	
10	Rothschönburg, near Deutschenbroda, Saxony.	J. M. Henderson.	J. M. Henderson, Z. D. G. G., XLVII, p. 539, 1895.	Mica syenite.	In W. T., p. 389.
11	Rocov-Kamik, near Sofia, Bulgaria.	L. Dimitrow.	L. Dimitrow, Ds. Ak. W. Wien., LX, p. 497, 1893.	Pyroxene syenite.	In W. T., p. 201.

TRACHYTE.

1	Nashs Point, Burlington, Vermont.	J. F. Kemp.	Kemp and Marsters, U. S. G. S. B. 107, p. 20, 1893.	Bostonite.	In W. T., p. 199.
2	Adler's villa, Santa Cruz, West Indies.	P. T. Cleve.	P. T. Cleve, Sv. Vet. Ak. Hndl., IX, No. 12, p. 34, 1871.	Felsite.	Cf. Högbom, B. G. Inst. Ups., VI, p. 230, 1905.
3	Hamilton Hill, Peebleshire, Scotland.	J. J. H. Teall.	A. Geikie, G. S. G. B. A. R., p. 40, 1897.	Soda felsite.	Not in W. T.
4	Killerton Park, Exeter, England.	J. S. G. Wilson.	J. J. H. Teall, G. S. Eng. Mem. Sh. 325, p. 78, 1902.	Biotite trachyte.	Iron oxides?

TRACHYTE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5 A4. IV	49.09	16.00	7.14	4.30	5.02	8.27	4.49	4.79	0.77				0.23	SO ₂ trace	100.10	
6 A2. II	64.69	18.34	n. d.	3.44	0.50	1.72	4.61	6.46	0.24		0.31	0.18	trace	SO ₂ none Cl trace F 0.09 BaO	100.58	2.57
7 A3. III	71.14	11.14	n. d.	2.73	1.62	3.17	1.40	4.13	1.77		none	trace	trace	X SO ₂ 1.05 Cl 1.78 CO ₂ trace LiO ₂ trace	99.83	
8 A4. IV	63.63	17.99	5.84	trace	none	4.21	4.25	3.81	0.15				0.69		100.57	2.307
9 A4. IV	68.80	14.95	4.36	n. d.	0.20	0.48	4.90	5.58	0.73					CO ₂ none	100.00	2.33
10 A4. IV	58.50	17.67	n. d.	5.64	1.09	3.86	4.17	7.22	1.60						99.75	

MONZONITE.

1 A4. IV	48.00	12.52	8.74	n. d.	15.26	7.94	3.11	2.68	1.36		0.22				99.83	2.75
2 A3. III	47.34	19.60	7.15	6.82	4.54	8.00	3.68	1.67	n. d.		trace	0.65		S 0.43	99.88	

DIORITE.

1 A3. III	47.32	17.00	3.89	6.48	8.58	10.01	2.36	0.46	3.23	0.34				CO ₂ trace	99.67	
2 A3. III	46.23	18.29	6.55	7.07	7.04	9.99	3.07	0.79	1.02	0.05	trace	0.21	0.12	NiO trace SrO trace	100.43	2.98
3 A3. III	45.75	18.51	6.55	6.02	5.06	11.85	3.41	2.35	0.20	0.06		trace			99.76	
4 B3. IV	47.5	15.6	2.6	7.1	11.7	9.8	1.4	1.5	2.4					Cr ₂ O ₃ 0.1	97.7	2.96
5 A3. III	59.00	15.50	trace	6.20	5.95	4.08	2.54	3.08	2.00		1.03	0.18			99.58	
6 A3. III	47.14	19.34	4.02	6.12	6.06	13.68	1.61	0.17	2.00			trace	trace	S 0.10	100.24	
7 A3. III	54.07	18.57	3.30	5.71	4.92	8.41	2.93	1.64	0.21						99.76	
8 A4. IV	43.75	18.02	7.50	5.31	10.68	12.40	1.46	0.51	1.21						100.84	
9 A4. IV	47.40	18.17	5.42	6.60	7.17	12.23	2.75	0.20	0.75		trace		trace		100.69	

TRACHYTE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	Laacher See, Rheinland.	W. Bruhns.	W. Bruhns, Ref. N. J., II, p. 418, 1892.	"Trachyte" (dark).	TiO ₂ n. d. In W. T., p. 341.
6	Algersdorf, Bohemia.	F. Ullik.	J. E. Hibsch, T. M. P. M., IX, p. 247, 1888.	Trachyte.	In W. T., p. 201.
7	Sassofoorte, Roccastrada, Tuscany.	R. V. Matteucci.	R. V. Matteucci, B. C. G. It., XXI, p. 285, 1890.	"Trachyte."	In W. T., p. 139.
8	Bondi, near Sydney, New South Wales.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XX, p. 235, 1887.	Pumice.	Floated block. In W. T., p. 401.
9	Banks Peninsula, New Zealand.	J. S. MacLaurin.	J. S. MacLaurin, N. Z. G. S. A. R. 4, p. 30, 1909.	Trachyte.	
10	Castle Rock, Coromandel, New Zealand.	J. M. Maclaren.	J. M. Maclaren, Tr. N. Z. Inst., XXXII, p. 215, 1900.	Hornblende trachyte.	Al ₂ O ₃ and FeO interchanged in original.

MONZONITE.

1	Kentallen, Loch Linthe, Scotland.	J. J. H. Teall.	A. Geikie, G. S. G. B. A. R., 1897, p. 22.	Olivine monzonite.	Not in W. T.
2	Tveit, Manger, near Bergen, Norway.	Lillejord.	C. F. Kolderup, Berg. Mus. Aarb., No. 12, p. 107, 1903.	Mangerite.	

DIORITE.

1	Keswick, Shasta County, California.	R. C. Wells.	B. S. Butler, U. S. G. S. B. 419, p. 138, 1910.	Diorite.	
2	Pajaro, San Benito County, California.	J. E. Reid.	J. E. Reid, Un. Cal. Dep. G., B. III, p. 185, 1902.	Diorite.	
3	San José, Tamaulipas, Mexico.	G. I. Finlay.	G. I. Finlay, An. N. Y. Ac. Sci., XIV, p. 263, 1904.	Diorite.	
4	Ben Damhain, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Diorite.	In W. T., p. 329.
5	Vallée du Lys, Pyrenees.	Pisani.	A. de Romeu, B. Soc. M. Fr., XXX, p. 147, 1907.	Microdiorite.	
6	Zdirec, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R. A. Wien., LIX, p. 174, 1909.	Gabbro-diorite.	
7	Tiszolcz, Gömör, Hungary.	M. Dittrich.	H. Junghann, N. J. B. B., XXXIII, p. 20, 1911.	Diorite.	
8	Bet. Solwa and Supreya, Ural Mountains.	L. Lessing and Kultacheff.	Loewinson-Lessing, Jushno-Saos., p. 166, 1900.	Microdiorite.	In W. T., p. 335.
9	Orepuki, Otago, New Zealand.	R. A. Farquharson.	R. A. Farquharson, Tr. N. Z. Inst., XLIII, p. 465, 1911.	Diorite.	

ANDESITE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 A2. II	54.50	17.97	8.55	n. d.	3.37	9.36	2.34	1.62	0.96	0.14	0.94	0.31	trace	CO ₂ none S 0.03 Cr ₂ O ₃ none NiO none BaO 0.06 SrO 0.05 Li ₂ O trace	100.80	
2 A3. III	62.94	18.14	n. d.	3.82	3.06	6.28	3.83	1.22	0.60		0.41	0.10			100.40	
3 A3. III	62.00	17.84	n. d.	4.40	2.64	5.37	4.29	1.47	1.66		0.17	0.29	trace		100.13	
4 A3. III	67.83	15.02	n. d.	5.16	0.29	3.07	2.40	3.20	1.11		1.04	0.26			99.38	
5 A3. III	61.58	16.34	n. d.	6.42	2.85	5.13	2.69	3.65	0.64		0.68	0.28			100.26	
6 A3. III	57.25	17.18	n. d.	6.60	4.31	6.29	4.71	2.75	0.59			0.25	0.57		100.50	2.71
7 A4. IV	56.89	19.72	4.06	3.65	1.91	5.87	5.14	1.96	0.62		trace	trace		SO ₃ trace Cl trace Li ₂ O trace Ag trace	99.82	
8 A3. III	47.25	18.80	trace	8.20	4.81	9.05	2.62	2.38	4.10		2.34	0.50			100.05	
9 A3. III	53.59	17.96	n. d.	7.74	2.55	6.53	4.54	3.18			3.26		0.68		100.03	
10 A4. IV	52.35	17.90	9.38	2.02	1.90	8.45	4.97	0.76	1.17			0.45	trace		99.35	
11 A4. IV	66.11	12.10	7.74	n. d.	1.70	4.09	2.86	2.73	2.11	0.08					99.52	
12 A4. IV	59.31	16.95	n. d.	8.07	1.65	4.30	1.59	3.42	2.64	2.10		0.40			100.43	
13 A4. IV	61.90	18.60	5.65	n. d.	2.44	4.67	3.05	2.64	1.70						100.65	
14 A4. IV	50.86	15.65	10.85	n. d.	6.03	11.76	2.01	1.56	0.20		0.63	trace	trace		99.55	3.01
15 A3. III	61.65	15.98	4.49	n. d.	2.63	4.41	5.69	2.75	0.97		0.67			SO ₃ 0.08 Cl 0.14	99.46	
16 A3. III	63.30	14.52	5.82	n. d.	1.66	4.00	5.14	1.43	2.17		1.08		0.23	Soluble 0.82	100.17	
17 A3. III	58.31	12.01	6.41	0.97	2.47	11.99	4.13	2.00	1.56						99.85	2.645
18 A3. III	52.63	16.66	5.20	3.18	3.87	11.72	5.15	1.59	0.68						100.68	2.819

ANDESITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Elkhorn District, Montana.	H. N. Stokes.	J. S. Barrell, U. S. G. S. A. R. 22, II, p. 529, 1901.	Andesite.	
2	Lassen Peak, California.	P. W. Shimer.	Hague and Iddings, A. J. S., XXVI, p. 225, 1883.	Andesite.	In W. T., p. 419.
3	Mount Shasta, California.	P. W. Shimer.	Hague and Iddings, A. J. S., XXVI, p. 230, 1883.	Andesite.	In W. T., p. 235.
4	Hoosac Mountain, Eureka District, Nevada.	R. W. Mahon.	A. Hague, U. S. G. S. Mon. 20, p. 264, 1892.	Andesite.	In W. T., p. 419.
5	Richmond Mountain, Eureka District, Nevada.	T. M. Drown.	A. Hague, U. S. G. S. Mon. 20, p. 264, 1892.	Andesite.	Not in W. T.
6	Tunguragua, Ecuador.	Boehm.	F. Tannhäuser in W. Reiss, Ecuador, II, p. 150, 1904.	Pyroxene andesite.	
7	Cotopaxi, Ecuador.	J. W. Mallet.	J. W. Mallet, Pr. R. Soc., XLII, p. (2), 1887.	Andesite ash.	July 22, 1885. In W. T., p. 281.
8	Piquette deras Lids, Pyrenees.	Pisani.	A. de Romeu, B. Soc. M. Fr., XXX, p. 184, 1907.	Augite andesite.	
9	Temple Bay, Spitzbergen.	H. Bäckström.	H. Bäckström, Sv. Vet. Ak. Hnd., XVI (2), No. 5, p. 39, 1890.	Augite andesite.	Floated block. In W. T., p. 423.
10	Grubehorn, Siebengebirge.	Not stated.	E. Kaiser, Vh. Nh. Ver. Bonn, LIV, p. 176, 1897.	Andesite.	In W. T., p. 285.
11	Pizzo del Corvo, Panaria, Aeolian Islands.	F. Glaser.	A. Bergeat, Sb. Bay. Ak., XX, p. 59, 1899.	Andesite.	In W. T., p. 425.
12	Varesana, Lipari, Aeolian Islands.	F. Glaser.	A. Bergeat, Sb. Bay. Ak., XX, p. 102, 1899.	Cordierite andesite.	In W. T., p. 425.
13	Hagios Paylos, Lemnos Island, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 223, 1898.	Trachyandesite.	Not in W. T.
14	Perumbakan, South Arcot, Madras, India.	T. H. Holland.	T. H. Holland, Q. J. G. S., LIII, p. 409, 1897.	Augite andesite.	In W. T., p. 429.
15	Una Una Volcano, Tomini Bay, Celebes.	Not stated.	A. Wichmann, Z. D. G. G., LIV, p. 154, 1902.	Volcanic ashes.	
16	Krakatoa Volcano.	A. Renard.	R. D. M. Verbeek, Krakatau, p. 320, 1885.	Andesite ash.	Collected at Batavia. Not in W. T.
17	Merapi Volcano, Sumatra.	A. Clausnizer.	R. D. M. Verbeek, Sum. Westk., p. 518, 1883.	Volcanic ash.	Not in W. T.
18	Manienjoe Volcano, Sumatra.	A. Clausnizer.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Augite andesite.	Not in W. T.

GABBRO.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 A3. III	49.84	18.94	1.51	6.40	7.39	10.32	1.99	1.28	2.57						100.24	
2 A3. III	48.02	17.50	1.80	7.83	10.21	13.16	1.48	trace	0.79						100.79	
3 A3. III	46.85	19.72	3.22	7.99	7.75	13.10	1.56	0.09	0.56						100.84	
4 A3. III	46.68	17.12	2.18	7.61	10.34	13.46	1.75	trace	0.88			trace	trace		100.02	3.069
5 A3. III	51.46	14.35	3.90	5.28	9.54	9.08	2.92	0.24	3.30					CO ₂ 0.20	100.27	
6 A3. III	49.56	20.09	2.32	2.02	7.01	15.62	1.63	0.34	2.25						100.84	
7 A3. III	53.50	15.01	n. d.	9.45	7.05	10.30	2.50	0.52	0.50		1.63				100.46	
8 A4. IV	51.25	19.20	n. d.	7.10	6.05	12.30	1.54	0.60	1.30		1.22				100.56	
9 A4. IV	47.36	14.06	3.23	6.07	11.48	12.80	1.54	1.25	1.56			0.40	trace	S 0.09	99.84	
10 A3. III	47.00	17.72	2.74	5.58	9.62	10.99	2.78	1.51	1.30			0.38			99.62	
11 A3. III	48.42	15.96	3.04	8.73	6.88	12.68	2.00	0.24	1.61						99.56	
12 A3. III	46.56	12.33	6.02	7.09	12.49	13.18	1.75	0.24	0.54				trace		100.20	
13 A3. III	46.37	16.73	9.76	2.48	7.00	12.49	2.08	1.30	0.65				0.53	SO ₂ 0.84 CuO 0.08	99.55	
14 A3. III	41.91	19.16	10.70	2.91	8.10	14.42	0.47	0.14	1.28			0.07	0.38	SO ₂ 0.28	99.82	
15 A3. III	44.64	18.54	6.63	4.65	2.52	22.17	0.80	0.05	0.18				0.09		100.27	
16 A3. III	44.11	19.38	5.17	5.44	2.90	21.98	0.50	0.13	0.26						99.87	
17 A4. IV	46.60	18.20	6.80	n. d.	5.97	13.40	4.42	1.45	0.93		2.98				100.75	
18 A3. III	48.20	15.63	n. d.	8.55	4.55	6.90	5.33	1.56	4.50		4.55	0.38			100.15	

GABBRO.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Cross Lake, Cobalt, Ontario.	Not stated.	W. G. Miller, Rep. Bur. Min. Ont., XIV (II), p. 50, 1906.	Gabbro.	
2	Baltimore area, Maryland.	L. McCay.	G. H. Williams, U. S. G. S. B. 28, p. 39, 1886.	Gabbro-diorite.	19 specimens. In W. T., p. 331.
3	Baltimore area, Maryland.	L. McCay.	G. H. Williams, U. S. G. S. B. 28, p. 39, 1886.	Gabbro.	23 specimens. In W. T., p. 331.
4	Windsor road, Baltimore, Maryland.	L. McCay.	G. H. Williams, U. S. G. S. B. 28, p. 37, 1886.	Gabbro-diorite.	In W. T., p. 331.
5	Sturgeon Falls, Menominee River, Michigan.	R. B. Riggs.	G. H. Williams, U. S. G. S. B. 62, p. 76, 1890.	Gabbro.	In W. T., p. 331.
6	Point Sal, California.	H. W. Fairbanks.	H. W. Fairbanks, B. Dep. G. Un. Cal., II, p. 50, 1896.	Gabbro.	In W. T., p. 291.
7	Ernée, Brittany, France.	Pisani.	L. Vandernotte, C. R., CXLVIII, p. 1204, 1909.	Gabbro-norite.	
8	La Germionniere, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 83, 1913.	Gabbro.	
9	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien., LIX, p. 188, 1909.	Gabbro.	
10	Wischkowitz, n. Marienbad, Bohemia.	A. Pelikan.	A. Pelikan, Ref. N. J., 1904, I, p. 48.	Gabbro.	
11	Katechersky, Koswinsky, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord., I, p. 214, 1902.	Gabbro.	
12	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord., I, p. 157, 1902.	Microgabbro.	
13	Werkh Issetsk, Mursinsk, Ural Mountains.	G. Katerfeld.	W. Nikitin, Mem. C. G. Rus., XXII, p. 78, 1907.	Gabbro.	
14	Werkh Issetsk, Mursinsk., Ural Mountains.	G. Katerfeld.	W. Nikitin, Mem. C. G. Rus., XXII, p. 82, 1907.	Gabbro.	
15	Kedabek, Elizabetopol, Caucasus.	A. Kupfer.	E. C. Fedorof, An. Inst. Agron. Mosc., VII, 1901.	Kedabekite.	In W. T., p. 339.
16	Kedabek, Elizabetopol, Caucasus.	A. Kupfer.	E. C. Fedorof, An. Inst. Agron. Mosc., VII, 1901.	Kedabekite.	In W. T., p. 339.
17	Ampangarinana, Nosy Komba, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 39, 1902.	Gabbro.	
18	Pou-tche-ho Valley, Yunnan, China.	Pisani.	J. Deprat, Mem. Sv. G. Ind. Ch., I (1), 1, p. 231, 1912.	Gabbro.	

DIABASE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 A4. IV	50.48	17.03	1.25	7.81	9.32	10.96	1.95	0.24	0.82	0.22				NiO 0.04	100.12	
2 A3. III	49.90	16.32	n. d.	13.54	6.22	6.58	1.82	2.25	0.76		1.47	0.17	trace		99.03	3.026
3 A4. IV	50.76	12.83	4.98	10.09	6.67	9.88	3.52	0.62	0.87						100.22	
4 A4. IV	51.31	13.64	0.52	8.49	12.73	12.41	1.40	0.32			trace	trace	trace		100.82	
5 A4. IV	50.88	13.17	1.11	9.66	13.05	10.19	1.17	0.31	0.14				trace		99.67	
6 A4. IV	47.66	19.24	1.83	8.67	10.79	9.91	1.14	0.26	0.06					CO ₂ none	99.56	
7 B3. IV	47.67	17.55	2.51	12.59	5.65	10.75	2.21	0.65	0.35	0.40		0.17	0.19	CO ₂ 0.18 Cl 0.05 S 0.18	101.10	3.02
8 A3. III	47.25	18.00	2.21	12.42	6.35	11.45	1.96	0.66				0.16	0.18	Cl 0.02 S 0.09	100.75	3.01
9 A3. III	47.10	17.47	2.66	12.93	6.88	10.27	1.91	0.59				0.16	0.15	Cl 0.09 S 0.11	100.32	3.02
10 A4. IV	46.94	16.91	12.53	4.56	8.20	9.00	2.15	0.54	0.26			0.28			100.75	
11 A3. III	48.93	20.99	2.02	9.36	4.39	8.03	3.06	1.80	1.18			0.15	0.31	S acre	100.22	3.027
12 A4. IV	52.69	18.93	10.99	n. d.	2.56	5.31	4.04	2.11	2.76		0.60	0.80	trace		100.79	
13 A4. IV	50.95	17.50	14.42	n. d.	2.63	6.85	3.38	1.65	2.02		0.50	0.78			100.68	
14 A4. IV	50.65	18.45	13.80	n. d.	2.68	6.22	3.71	1.92	2.02		0.50	0.78	trace		100.73	
15 A4. IV	49.20	19.13	13.60	n. d.	3.08	7.18	3.63	1.89	1.31		0.56	0.75	trace		100.33	
16 A3. III	50.07	16.80	0.84	11.06	10.97	6.46	1.75	1.13	0.10				0.54		99.72	
17 A3. III	49.31	16.93	4.02	5.90	9.36	9.57	2.41	0.47	2.35						100.32	
18 A3. III	49.21	19.81	6.59	2.10	5.27	11.32	2.54	1.81	1.11		trace		trace		99.76	
19 A3. III	54.17	16.15	2.70	8.83	4.81	7.91	3.02	0.65	1.04				0.22	SO ₂ 0.61	100.11	
20 A3. III	47.39	13.19	6.86	8.17	6.97	11.11	2.62	0.59	1.85			0.32	0.40	S 0.32	99.79	

DIABASE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Cobalt, Ontario.	R. E. Hore.	R. E. Hore, J. G., XVIII, p. 275, 1910.	Quartz diabase.	
2	Bleazard Mine, Sudbury, Ontario.	T. L. Walker.	T. L. Walker, Q. J. G. S., LIII, p. 56, 1897.	Diabase.	In W. T., p. 439.
3	Little John Island, Portland, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXII, p. 341, 1898.	Diabase porphyry.	In W. T., p. 327.
4	The Twins, Culpeper County, Virginia.	W. G. Brown.	Campbell and Brown, B. G. S. A., II., p. 346, 1891.	Hypersthene diabase.	In W. T., p. 331.
5	The Twins, Culpeper County, Virginia.	W. G. Brown.	Campbell and Brown, B. G. S. A., II., p. 346, 1891.	Olivine- hypersthene diabase.	In W. T., p. 331.
6	Fairmont, Davidson County, North Carolina.	A. S. Wheeler.	J. E. Pogue, A. J. S., XXVIII, p. 230, 1909.	Diabase.	Also in N. C. G. S. B. 22, p. 73, 1910.
7	Lighthouse Point, Marquette, Michigan.	E. E. Ware.	A. C. Lane, J. G., XII, p. 89, 1904.	Diabase.	616 millimeters from contact.
8	Lighthouse Point, Marquette, Michigan.	E. E. Ware.	A. C. Lane, J. G., XII, p. 89, 1904.	Diabase.	4,115 millimeters from contact.
9	Lighthouse Point, Marquette, Michigan.	E. E. Ware.	A. C. Lane, J. G., XII, p. 89, 1904.	Diabase.	7,600 millimeters from contact.
10	Skrainka, Madison County, Missouri.	Technical.	E. Haworth, Mo. G. S. A. R. VIII, p. 113, 1895.	Olivine diabase.	
11	Sugarloaf Hill, Boulder County, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 228, p. 187, 1904.	Diabase.	
12	Kullagarden, Kullen, Sweden.	L. G. Thomé.	A. Hennig, Lunds. Un. Aars., XXXV, No. 5, p. 24, 1899.	Kullaite (diabase).	In W. T., p. 441.
13	Mölle, Kullen, Sweden.	L. G. Thomé.	A. Hennig, Lunds. Un. Aars., XXXV, No. 5, p. 12, 1899.	Konga diabase.	In W. T., p. 441.
14	Bökebolet, Kullen, Sweden.	L. G. Thomé.	A. Hennig, Lunds. Un. Aars., XXXV, No. 5, p. 28, 1899.	Diabase.	In W. T., p. 441.
15	Tanga, Kullen, Sweden.	L. G. Thomé.	A. Hennig, Lunds. Un. Aars., XXXV, No. 5, p. 28, 1899.	Olivine diabase.	In W. T., p. 441.
16	Karlshamn, Blekinge, Scania, Sweden.	H. Santesson.	J. C. Moberg, Afh. Sv. G. Und., No. 158, p. 27, 1896.	Diabase.	In W. T., p. 335.
17	St. Sigismund, Tyrol.	Not stated.	H. v. Foullon, Jb. G. R.-A. Wien, XXXVI, p. 771, 1886.	Quartz-hornblende diabase.	In W. T., p. 335.
18	Leparo, Vicentino, Italy.	L. Maddalena.	L. Maddalena, Z. D. G. G., LIX, p. 392, 1907.	Dike rock (diabase).	
19	Lojo, Finland.	N. W. Slawsky.	P. P. Sustchinsky, Tr. Soc. Nw. St. P., XXXVI, (5), p. 36, 1912.	Metabasite.	
20	Issatschki Hill, Poltawa, Russia.	J. Morozewicz.	J. Morozewicz, Mem. C. G. Rus., No. 7, p. 32, 1903.	Diabase.	

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
21 A4. IV	52.80	14.60	n. d.	10.25	7.58	10.95	1.90	0.90	0.25		1.46				100.69	
22 A4. IV	51.80	13.77	n. d.	9.80	7.85	11.21	2.27	0.68	0.50		1.56	0.06			99.50	
23 A3. III	55.25	12.12	8.84	4.91	4.84	8.34	2.08	1.62	1.65						99.65	
24 A3. III	51.68	13.88	6.59	4.44	7.87	10.99	2.93	0.81	0.74						99.93	
25 A3. III	49.78	14.49	0.81	7.46	9.53	13.44	1.71	0.68	1.43			0.05			99.38	
26 A3. III	76.22	12.55	3.52	n. d.	0.70	0.66	0.08	2.01	3.72	0.32	0.86	trace	CO ₂	none	100.64	2.47
27 A3. III	53.06	13.67	4.83	9.96	5.31	8.62	3.22	1.29	0.38			0.56			100.90	3.07

LAMPROPHYRE.

1 A3. III	52.29	19.38	4.40	6.00	3.54	7.79	2.12	4.12	0.95						100.52	
2 A4. IV	52.70	15.07	8.41	n. d.	7.23	5.33	3.12	4.81	2.38		1.71				100.76	
3 A3. III	51.32	17.84	4.34	6.70	4.18	9.51	3.01	1.52	1.98						100.50	
4 A3. III	46.97	12.98	5.59	9.37	8.54	7.95	2.36	1.29	2.64	0.39	trace	0.63			100.57	3.02
5 A3. III	51.97	8.05	11.66	1.19	15.00	7.21	1.55	1.02	2.25		0.13	0.14			100.16	
6 A3. III	42.49	17.68	5.12	5.90	5.28	15.81	4.29	2.97	0.38						99.92	
7 A3. III	44.43	14.45	8.60	3.21	9.08	12.73	3.45	3.08	0.40			0.56			99.99	

BASALT.

1 A3. III	52.68	14.14	1.95	9.79	6.38	9.38	2.56	0.87	1.60			0.44			99.79	2.97
2 A3. III	52.42	14.54	1.25	9.84	7.33	10.59	2.23	0.49	0.55			0.51			99.75	3.00
3 A3. III	53.13	13.74	1.08	9.10	8.58	9.47	2.30	1.03	0.90			0.43			99.76	2.96
4 A3. III	51.36	16.25	2.14	8.24	7.97	10.27	1.54	1.06	1.33			0.09	NiO	0.03	100.28	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
21	French Guinea.	Not stated.	Lemoine and Chantard, B. Soc. G. Fr., VIII, p. 35, 1908.	Ophite.	
22	French Guinea.	Not stated.	Lemoine and Chantard, B. Soc. G. Fr., VIII, p. 35, 1908.	Diabase.	
23	Richmond, Cape Colony.	Feder.	E. Cohen, N. J. B. B., V, p. 240, 1887.	Quartz diabase.	In W. T., p. 245.
24	Colesburg, Cape Colony.	Gridmore and Halberstadt.	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine diabase.	In W. T., p. 325.
25	Hammong Ommang, Siberia.	Lindström.	Lindström, Ref., N. J., 1885, I, p. 430.	Olivine diabase.	In W. T., p. 445.
26	Leonora, Western Australia.	C. C. Williams.	C. F. V. Jackson. W. Aust. G. S. B. 13, p. 19, 1904.	Greenstone.	Altered.
27	Udandurra Creek, Northampton, Western Australia.	E. S. Simpson.	E. S. Simpson, W. Aust. G. S. A. R. (1897), p. 48, 1898.	Diabase.	Not in W. T.

LAMPROPHYRE.

1	Swastika Area, Ontario.	Not stated.	E. L. Bruce, Rep. Bur. Min. Ont., XXI, p. 263, 1912.	Augite lamprophyre.	
2	Weiler, near Weissenburg, Elsass.	G. Linck.	G. Linck, Abh. G. Kt. Els. Loth., III (I), p. 55, 1884.	Minette.	In W. T., p. 397.
3	Luciberg, Odenwald.	F. Kutscher.	C. Chelius, Nb. Ver. Erdk. (4), XIII, p. 10, 1892.	Luciite.	In W. T., p. 291.
4	Studené, Eule, Bohemia.	Not stated.	H. L. Barvir, Ref., N. J., 1904, I, p. 49.	Malchite.	
5	Gross, Hungary.	K. Emszt.	K. Emszt, Jb. Ung. G. A. (1903), p. 324, 1905.	Hornblende kersantite.	3 decimals. Iron oxides?
6	San José, Tamaulipas, Mexico.	G. I. Finlay.	G. I. Finlay, Ann. N. Y. Ac. Sci., XIV, p. 289, 1904.	Camptonite.	
7	Zakharovka River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aur. Sib., IX, p. 307, 1910.	Camptonite.	

BASALT.

1	Mount Holyoke, Massachusetts.	G. W. Hawes.	G. W. Hawes, A. J. S., IX, p. 186, 1875.	Dolerite.	Not in W. T.
2	Wintergreen Lake, New Haven, Connecticut.	G. W. Hawes.	G. W. Hawes, A. J. S., IX, p. 189, 1875.	Dolerite.	Not in W. T.
3	Jersey City, New Jersey.	G. W. Hawes.	G. W. Hawes, A. J. S., IX, p. 187, 1875.	Dolerite.	Not in W. T.
4	Watchung Mountain, Orange, New Jersey.	L. G. Eakins.	J. P. Iddings, U. S. G. S. B. 150, p. 255, 1898.	Basalt.	In W. T., p. 331.

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5 A3. III	55.89	20.01	1.77	4.72	4.57	8.12	2.66	2.29	0.19				0.06		100.28	
6 A3. III	51.08	15.55	7.71	8.55	4.48	9.00	3.29	0.53				0.04			100.23	
7 A4. IV	56.54	14.75	n. d.	9.29	6.51	7.80	2.07	2.96			0.55	0.29			100.76	
8 A3. III	47.30	18.27	2.24	6.95	6.78	7.95	5.99	1.00	0.07		(1.47)	1.61			99.63	
9 A3. III	45.11	17.41	12.55	0.20	4.19	9.10	3.13	1.89	1.86		3.34	0.87	0.20	SO ₃ BaO	0.04 0.08	99.97
10 A4. IV	52.60	14.17	11.38	n. d.	6.37	9.17	2.90	1.06	2.08		0.57				100.30	
11 A4. IV	53.78	14.22	9.66	n. d.	7.12	7.44	3.11	0.89	1.73		2.22				100.46	
12 A3. III	50.22	15.31	4.87	6.54	7.13	8.72	3.02	1.68	2.78			0.54		Cl	0.10	100.91
13 A3. III	49.55	14.97	4.78	6.90	7.36	8.57	3.47	2.27	2.09						99.96	2.91
14 A3. III	46.14	13.10	10.56	n. d.	12.55	9.97	2.61	2.02	1.02		1.07	1.46	trace	CO ₂	trace	100.50
15 A3. III	45.80	13.41	6.89	5.69	12.82	9.91	3.57	1.41				0.46			99.96	
16 A3. III	43.63	14.14	7.72	4.96	9.73	11.83	2.84	1.45	3.22		trace	0.94			100.46	2.934
17 A3. III	41.58	16.96	8.06	4.61	10.76	11.12	4.23	1.23	1.74		trace	0.41			100.70	3.00
18 A3. III	42.71	16.03	9.31	1.83	10.44	14.70	2.71	0.24	2.78						100.75	
19 A3. III	45.52	14.02	8.21	6.64	8.01	13.77	2.60	1.12	0.82						100.71	
20 A3. III	48.48	17.52	2.06	8.73	7.11	12.04	2.42	0.96	1.01						100.33	
21 A3. III	47.96	17.22	6.41	5.21	7.40	12.04	2.53	0.85	0.78						100.40	
22 A3. III	47.68	16.67	6.82	4.56	7.66	12.23	3.01	0.72	0.80						100.15	
23 A3. III	51.79	11.36	11.99	n. d.	13.47	8.37	1.99	0.64	0.16	0.13	0.87	0.28	0.24	SO ₃	0.18	101.07
24 A3. III	48.70	11.51	17.95	n. d.	6.23	10.05	2.80	0.40	0.46	0.13	1.67	trace	0.27	SO ₃ Insol.	0.53 0.01	100.71

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	Mount Pitt, Oregon.	R. W. Woodward.	A. B. Emmons, B. Cal. Ac. Sci., I, p. 234, 1885.	Basalt.	Not in W. T.
6	Dalles, Columbia River, Oregon.	H. W. Muthmann.	K. Oebbeke, N. J., 1885, I, p. 226.	Basalt.	In W. T., p. 327.
7	Basalt Peak, Eureka District, Nevada.	E. Hart.	A. Hague, U. S. G. S. Mon. 20, p. 264, 1892.	Basalt.	Not in W. T.
8	Pedregal, Tlalpam, near Mexico, Mexico.	P. Kraus.	H. Lenk in Felix and Lenk, Btr. G. Mex., I, p. 103, 1890.	Basalt.	In W. T., p. 303.
9	Louchadiere, Puy de Dome, Auvergne.	P. Holland.	Dickson and Holland, Pr. Liv. G. Soc., VIII, p. 412, 1899.	Lava (basalt?).	Not in W. T.
10	Reichshofen, Vogesen.	G. Linck.	G. Linck, Mt. G. Unt. Els., I, p. 52, 1888.	Basalt.	In W. T., p. 449.
11	Schiffenberg, Giessen, Hesse.	A. Streng.	A. Streng, Ber. Oberh. Ges., XXIX, p. 99, 1893.	Anamesite.	In W. T., p. 451.
12	Eisenberg, Knüll District, Hesse.	H. Wolff.	K. Oebekke, Jb. Pr. G. L.-A. (1888), p. 395, 1889.	Basalt.	In W. T., p. 323.
13	Hohebaum, Lottersberg, Hesse.	H. Wolff.	K. Oebekke, Jb. Pr. G. L.-A. (1888), p. 397, 1889.	Basalt.	In W. T., p. 323.
14	Stempel, near Marburg, Hesse Nassau.	F. W. Kuester.	M. Bauer, N. J., 1891, II, p. 159.	Basalt.	In W. T., p. 449.
15	Wostray, near Milleschau, Bohemia.	J. Hanaman.	J. Hanaman, Arch. Landf. Bohm., VII, No. 3, p. 69, 1890.	Basalt.	
16	Bachelsdorf, near Tetschen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XV, p. 247, 1896.	Basalt.	In W. T., p. 345.
17	Bachelsdorf, near Tetschen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XV, p. 247, 1896.	Basalt.	In W. T., p. 345.
18	Burberg, near Karlsbad, Bohemia.	J. M. Clements.	J. M. Clements, Jb. G. R.-A. Wien, XL, p. 345, 1890.	Basalt.	In W. T., p. 347.
19	Sete Cidades, Sao Miguel, Azores.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 662, 1912.	Basalt.	
20	2,414 meters deep, 114 sea miles northeast of New Amsterdam Island.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 73, 1908.	Basalt.	Dredged block. Cf. No. 151, II.5.4.4.
21	New Amsterdam Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (5), p. 391, 1909.	Basalt.	
22	Landing Place, New Amsterdam Island.	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3), p. 73, 1908.	Basalt.	
23	Dodbettadahalli, Yelahanka, Mysore, India.	Not stated.	E. W. Wetherell, Mys. G. Dep., Mem. 2, p. 65, 1905?	Enstatite dolerite.	
24	Nundydroog Mine, Mysore, India.	E. W. Wetherell.	E. W. Wetherell, Mys. G. Dep., Mem. 2, p. 54, 1905?	Dolerite.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
25 A3. III	50.54	19.80	6.45	3.70	3.11	11.75	3.49	1.15	0.36						100.35	2.819
26 A3. III	45.47	17.63	8.16	2.25	8.27	13.04	3.60	0.93	0.99						100.34	2.732
27 A3. III	48.67	18.21	1.27	8.56	9.91	9.80	2.44	0.23	0.86					CO ₂ 0.05	100.00	2.74
28 A3. III	48.60	17.87	6.20	5.76	4.32	9.11	4.66	2.06	1.78						100.36	2.77
29 A3. III	48.40	13.05	9.02	7.33	7.26	8.30	3.50	0.57	2.84						100.27	
30 A3. III	47.68	17.90	4.48	9.05	8.71	5.65	2.35	2.68	1.16					Cl 0.20	99.86	
31 A3. III	45.89	17.17	2.60	11.77	5.80	10.05	3.60	1.54	1.20						99.63	
32 B3. IV	45.39	9.61	9.27	8.48	10.69	9.25	3.14	0.55	2.81						99.19	
33 B3. IV	44.84	11.92	9.12	8.54	10.34	9.23	1.43	0.68	3.04						99.14	
34 A3. III	50.16	17.97	2.23	6.25	4.70	11.85	3.50	2.80	none		trace	trace	0.30		100.66	
35 B3. IV	49.97	11.68	2.45	10.60	12.84	11.20	1.60	0.25	n. d.			0.33	trace		100.92	
36 A3. III	55.75	15.03	14.76	n. d.	0.54	4.30	5.90	2.23	0.11		0.75	0.77	0.20		100.34	
37 A3. III	45.85	13.10	14.94	n. d.	6.69	9.92	3.45	2.02	0.20		4.10	0.11	0.09		100.56	
38 A?3. III	49.75	15.25	12.67	n. d.	1.33	5.65	7.57	1.61	1.15		3.75		0.60		99.33	
39 A3. III	43.15	15.45	14.85	n. d.	7.10	8.80	4.10	1.25	1.13		3.44	1.08	0.13		100.48	
40 A3. III	41.95	13.40	15.75	n. d.	5.58	9.10	7.74	1.56	0.36		2.25	2.55	0.25		100.49	
41 A3. III	45.61	15.70	13.46	n. d.	4.84	6.34	5.06	2.67	2.34		3.48		trace		99.50	
42 A3. III	45.65	14.10	13.95	n. d.	7.02	9.10	3.82	1.01	1.30		3.70	0.52	0.08		100.25	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
25	Sago Volcano, Sumatra.	A. Clausnitzer.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Basalt.	Not in W. T.
26	Koeliet Manias Volcano, Sumatra.	A. Clausnitzer.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Basalt.	Not in W. T.
27	Paerata, New Zealand.	J. S. MacLaurin.	J. S. MacLaurin, N. Z. G. S. A. R. 41, p. 23, 1908.	Basalt.	
28	Dyers Pass, Canterbury, New Zealand.	R. Speight.	R. Speight, Tr. N. Z. Inst., XXVI, p. 409, 1894.	Dolerite.	In W. T., p. 301.
29	Mount Charles, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 410, 1906.	Dolerite.	
30	Mount Cargill, Dunedin, New Zealand.	J. A. Bartrum.	J. A. Bartrum, Tr. N. Z. Inst., XLIV, p. 176, 1912.	Basalt.	
31	Mount Holmes, Dunedin, New Zealand.	J. A. Bartrum.	J. A. Bartrum, Tr. N. Z. Inst., XLIV, p. 175, 1912.	Basalt.	
32	Papanui, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 410, 1906.	Dolerite.	
33	Papanui, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 410, 1906.	Dolerite.	
34	Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 191, 1888.	Augite andesite.	In W. T., p. 301.
35	Lat. 32° 36' S., Long. 137° 43' W., South Pacific Ocean.	Sipoez.	Murray and Renard, Challenger Rep., Deep Sea Dep., p. 307, 1891.	Volcanic glass.	Dredged block.
36	Camp Cove, Auckland Island.	B. C. Aston.	B. C. Aston, Subant. Islds., II, p. 768, 1909.	Basalt.	
37	Camp Cove, Auckland Island.	B. C. Aston.	B. C. Aston, Subant. Islds., II, p. 768, 1909.	Basalt.	Cf. No. 42.
38	Perseverance Harbor, Campbell Island.	B. C. Aston.	B. C. Aston, Subant. Islds., II, p. 767, 1909.	Basalt.	Sum low.
39	Antipodes Island.	B. C. Aston.	B. C. Aston, Subant. Islds., II, p. 763, 1909.	Basalt.	
40	Antipodes Island.	B. C. Aston.	B. C. Aston, Subant. Islds., II, p. 763, 1909.	Basalt scoria.	
41	Possession Island, Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Min. Mag., XII, p. 80, 1899.	Basalt.	
42	Enderby Island, Auckland Islands.	B. C. Aston.	B. C. Aston, Subant. Islds., II, p. 769, 1909.	Basalt.	Cf. No. 37.

NEPHELITE SYENITE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 A4. IV	55.64	19.81	n. d.	3.90	0.95	2.86	8.21	4.60	3.14	0.35		0.10			99.56	
2 A4. IV	55.59	23.55	n. d.	3.28	0.78	1.87	8.05	5.04	1.21				0.45		99.82	
3 A4. IV	59.70	18.85	4.85	n. d.	0.68	1.34	6.29	5.97	1.88						99.56	2.557
4 A4. IV	59.23	19.98	4.72	n. d.	1.10	2.41	5.47	5.76	1.38						100.05	2.521
5 A4. IV	59.62	18.67	5.07	n. d.	0.84	1.80	6.95	5.65	0.80					Li ₂ O trace	99.40	
6 A4. IV	58.74	20.85	4.15	n. d.	0.22	0.36	9.72	4.23	1.82						100.09	
7 A4. IV	56.06	20.10	3.82	n. d.	0.83	2.53	7.50	8.78	1.18						100.80	
8 A4. IV	53.10	22.50	5.10	n. d.	0.15	2.15	8.49	6.48	1.65						100.43	
9 A4. IV	52.75	22.55	3.65	n. d.	0.15	1.85	8.10	7.05	3.60						99.70	
10 A3. III	44.85	17.10	10.06	2.71	0.39	14.00	1.67	6.92	1.66		trace	trace	trace		99.36	
11 A4. IV	56.71	22.49	3.40	n. d.	1.19	2.22	7.37	5.87	0.45						99.70	
12 A3. III	54.85	18.33	6.96	n. d.	1.06	1.32	11.43	3.16	1.06		1.44		0.89		100.50	
13 A4. IV	53.54	22.52	3.50	n. d.	0.43	3.01	5.26	8.00	3.30			0.34			100.70	
14 A3. III	38.97	12.44	14.48	1.34	6.28	9.27	4.38	2.44	3.50		4.63	2.18			99.91	2.90

PHONOLITE.

1 A4. IV	54.07	21.67	3.55	n. d.	0.36	0.36	8.91	4.76	5.44		0.15				99.27	
2 A3. III	51.35	20.21	4.90	n. d.	1.53	5.75	4.43	6.68			0.80	0.28		SO ₂ 0.04 NaCl 0.06 FeS ₂ 4.01	100.04	
3 A4. IV	44.50	22.96	6.84	n. d.	1.65	8.65	6.70	4.83	2.06		1.40				99.59	
4 A4. IV	59.23	21.10	n. d.	4.13	0.47	0.64	8.67	4.49	1.18	0.10					100.01	
5 A4. IV	56.34	21.06	n. d.	4.21	0.71	3.34	9.27	4.08	0.90	0.07					99.98	

NEPHELITE-SYENITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Sturgeon Lake, Ontario.	A. G. Burrows.	W. G. Miller, A. G., XXXII, p. 185, 1903.	Nephelite syenite.	
2	Port Caldwell, Ontario.	E. L. C. Foster.	H. L. Kerr, Rep. Bur. Min. Ont., XIX (I), p. 209, 1910.	Nephelite syenite.	
3	Fourche Mountain, near Little Rock, Arkansas.	W. A. Noyes.	J. F. Williams, Ig. R. Ark., p. 81, 1891.	Nephelite syenite.	In W. T., p. 195.
4	Fourche Mountain, near Little Rock, Arkansas.	W. A. Noyes.	J. F. Williams, Ig. R. Ark., p. 88, 1891.	Nephelite syenite.	In W. T., p. 199.
5	Saline County, Arkansas.	W. A. Noyes.	J. F. Williams, Ig. R. Ark., p. 135, 1891.	Nephelite syenite.	In W. T., p. 197.
6	Saline County, Arkansas.	W. A. Noyes.	J. F. Williams, Ig. R. Ark., p. 139, 1891.	Nephelite syenite.	In W. T., p. 207.
7	Serra de Tingua, Brazil.	E. Hussak.	E. Hussak, N. J., 1892, II, p. 146.	Foyaite.	In W. T., p. 295.
8	Pocos de Caldas, Minas Geraes, Brazil.	J. Machado.	J. Machado, T. M. P. M., IX, p. 345, 1888.	Nephelite syenite.	In W. T., p. 211.
9	Pocos de Caldas, Minas Geraes, Brazil.	J. Machado.	J. Machado, T. M. P. M., IX, p. 334, 1888.	Nephelite syenite.	In W. T., p. 211.
10	Croc-na-Soaine, Sutherland, Scotland.	Not stated.	J. Shand, N. J. B. B., XXII, p. 441, 1906.	Borolanite.	
11	Bratholmen, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 38, 1890.	Ditroite.	In W. T., p. 213.
12	Angwundas, Lujavr-Urt, Kola, Finland.	W. Berghell.	W. Ramsay, Fennia, XV, No. 2, p. 16, 1898.	Lujaurite.	Not in W. T.
13	Harbour Cone, Dunedin, New Zealand.	D. R. Waters.	P. Marshall, Q. J. G. S., LXII, p. 392, 1906.	Hornblende foyaite.	
14	Michelsberg, Katzenbuckel, Odenwald.	G. Latterman.	W. Freudenberg, Mt. Bad. G. L.-A., VIII, p. 267, 1907.	Shonkinite.	Iron oxides.

PHONOLITE.

1	Near Hot Springs, Arkansas.	W. A. Noyes.	J. F. Williams, Ig. R. Ark., p. 370, 1891.	Tinguaite.	In W. T., p. 209.
2	Magnet Cove, Arkansas.	W. A. Noyes.	J. F. Williams, Ig. R. Ark., p. 263, 1891.	Nephelite felsite.	In W. T., p. 297.
3	Magnet Cove, Arkansas.	W. A. Noyes.	J. F. Williams, Ig. R. Ark., p. 261, 1891.	Nephelite porphyry.	In W. T., p. 403.
4	Squaw Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Tinguaite.	In W. T., p. 209.
5	Squaw Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.

PHONOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O−	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
6 A4. IV	57.88	20.46	n. d.	3.77	0.28	0.76	8.74	5.11	2.55	0.17					99.72	
7 A4. IV	58.59	20.77	n. d.	4.35	0.46	1.46	8.17	4.80	0.92	0.09					99.61	
8 A4. IV	57.21	18.67	n. d.	3.41	1.10	3.07	6.62	4.92	3.61	1.01					99.62	
9 A4. IV	56.94	21.03	n. d.	3.41	0.33	1.93	9.05	4.66	2.15	0.39					99.89	
10 A4. IV	56.57	20.74	n. d.	5.66	0.23	1.05	9.36	4.49	1.49	1.11					99.70	
11 A4. IV	55.94	20.91	n. d.	4.50	0.42	1.73	8.87	5.44	2.43	0.31					100.55	
12 A4. IV	55.60	19.71	n. d.	5.49	0.86	1.69	8.60	4.88	2.89	0.34					100.06	
13 A4. IV	55.62	20.46	n. d.	4.06	0.62	1.91	7.64	4.38	4.22	0.57					99.48	
14 A4. IV	55.73	20.06	n. d.	4.23	1.30	2.18	5.60	7.49	3.32	0.10			0.10		100.11	2.557
15 A4. IV	58.24	20.45	3.51	n. d.	0.38	1.27	8.76	5.87	1.52			trace		SO ₃ Cl trace 0.09	100.39	

NEPHELITE TEPHRITE, ETC.

1 A3. III	46.67	15.90	3.20	7.04	10.17	9.15	3.20	2.54	1.64			0.64	trace	SO ₂ Cl	trace 0.11	100.26	2.888
2 A3. III	48.41	16.24	4.89	6.41	7.25	9.38	3.23	2.33	2.11		trace					100.25	
3 A3. III	44.25	19.26	5.83	6.63	6.98	9.15	4.43	1.00	3.30		trace					100.83	
4 B3. IV	44.81	15.35	3.37	6.69	12.77	9.83	3.03	1.69	2.13			0.48		Cl	0.16	100.31	2.98
5 B3. IV	44.89	18.43	1.27	7.86	9.07	9.80	3.06	1.81	2.29			1.34				99.82	2.50
6 B3. IV	41.67	11.39	4.81	9.72	12.37	11.23	3.57	1.06	2.57			1.39				99.78	2.42
7 A3. III	39.90	10.02	12.88	4.09	14.84	13.28	2.48	1.77	0.52		trace	0.82	trace			100.60	3.19
8 A3. III	39.94	14.75	7.68	4.76	12.14	15.37	2.90	1.46	1.84							100.84	3.09
9 A4. IV	44.66	15.42	14.40	n. d.	5.20	9.21	2.44	1.02	1.56		6.60					100.51	

PHONOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
6	Calamity Gulch, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 209.
7	Bald Mountain, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 209.
8	Whitetail Gulch, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 201.
9	Ragged Top Mountain, Black Hills, South Dakota.	F. C. Smith.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 209.
10	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 209.
11	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 209.
12	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
13	Preston, Black Hills, South Dakota.	Flintermann.	J. D. Irving, Ann. N. Y. Ac. Sci., XII, p. 272, 1899.	Tinguaite.	In W. T., p. 213.
14	Homestake Mine, Lead, South Dakota.	W. J. Sharwood.	W. J. Sharwood, Ec. G., VI, p. 731, 1911.	"Green rock" (tinguaite).	
15	Lindig, Aschaffenburg, Spessart, Bavaria.	Not stated.	K. v. Gümbel, G. v. Bay., II, p. 637, 1894.	Phonolite.	Not in W. T.

NEPHELITE TEPHRITE, ETC.

1	Elkhead Mountain, Routt County, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 228, p. 187, 1904.	Nephelite tephrite.	
2	Der Sattel, Hesse.	Krauss.	K. Oebbeke, Jb. Pr. G. L.-A. (1888), p. 410, 1889.	Nephelite basanite.	In W. T., p. 323.
3	Krötenkopf, Hesse.	Krauss.	K. Oebbeke, Jb. Pr. G. L.-A. (1888), p. 406, 1889.	Nephelite basanite.	In W. T., p. 301.
4	Steller's Kuppe, Knüll District, Hesse.	H. Wolff.	K. Oebbeke, Jb. Pr. G. L.-A. (1888), p. 402, 1889.	Nephelite basanite.	3 decimals. In W. T., p. 345.
5	Rimberg, Knüll District, Hesse.	H. Wolff.	H. Wolff, Sb. Ph. Ges. Erl., XXII, p. 135, 1890.	Basanite.	3 decimals. Al ₂ O ₃ and MgO? Not in W. T.
6	Dohnberg, n. Oberaula, Knüll District, Hesse.	H. Wolff.	H. Wolff, Sb. Ph. Ges. Erl., XXII, p. 137, 1890.	Nephelite basalt.	3 decimals. In W. T., p. 351.
7	Löbauer Berg, Saxony.	J. Stock.	J. Stock, T. M. P. M., IX, p. 433, 1888.	Nephelite basalt.	In W. T., p. 359.
8	Scheft, Erzgebirge, Bohemia.	R. Reinisch.	R. Reinisch, N. J. B. B., XXIII, p. 495, 1907.	Nephelite basalt.	
9	Fagasá, Tutuila, Samoa.	Hobein.	M. Weber, Ab. Bay. Ak. W., XXIV, p. 301, 1909.	Nephelite basanite.	

LEUCITE ROCKS.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
1 A3. III	50.96	19.67	7.76	n. d.	0.36	4.38	7.96	6.77	1.38		0.52			SO ₃ Cl	trace 0.25	100.01	
2 A4. IV	55.06	23.29	3.29	n. d.	trace	1.46	6.76	8.86	1.08							99.80	
3 A4. IV	52.16	20.14	6.45	n. d.	1.54	4.64	5.73	8.12	1.39		trace		trace	CO ₂ SO ₃ Cl	trace trace trace	100.17	
4 A4. IV	53.45	21.28	4.08	n. d.	0.18	1.30	8.37	5.98	5.20					SO ₃ Cl	0.17 trace	99.95	
5 A3. III	53.80	19.10	6.40	n. d.	1.50	7.16	1.94	6.10	2.12		0.37	0.16	0.45	SO ₃	0.51	99.61	
6 A3. III	48.91	10.58	n. d.	12.38	7.64	10.64	3.62	2.68	n. d.		2.96	0.38		SO ₃	0.21	100.60	
7 A3. III	50.08	15.48	2.16	5.04	4.65	5.51	2.62	14.37	n. d.							99.91	
8 A3. III	47.77	8.18	4.20	6.13	12.03	14.15	0.61	7.53	n. d.							100.60	

LIMBURGITE.

1 A3. III	41.05	14.70	12.49	7.00	6.18	11.19	4.72	0.93	2.23							100.49	2.967
2 A3. III	41.69	14.85	10.39	5.43	9.84	11.20	3.71	1.05	1.06							99.32	2.851

PYROXENITE, ETC.

1 A3. III	42.68	18.36	5.27	7.02	12.89	10.05	1.69	0.51	1.25							99.80	
2 A3. III	47.29	16.93	1.58	2.67	21.01	8.56	1.17	0.39	0.29							99.89	
3 A3. III	47.09	16.99	1.62	3.60	19.92	9.20	0.50	0.25	0.83							100.00	
4 A3. III	44.38	17.60	1.42	3.91	15.14	16.03	0.78	0.15	0.59							100.00	
5 A3. III	42.32	15.41	2.69	5.96	19.25	11.97	1.04	0.24	1.23							100.11	
6 A3. III	38.95	19.80	3.01	4.54	16.42	12.05	0.89	0.37	3.36							99.39	
7 A3. III	38.58	20.42	7.60	5.91	12.93	9.43	2.29	1.39	1.25							99.80	

LEUCITE ROCKS.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Diamond Jo Quarry, Magnet Cove, Arkansas.	W. A. Noyes.	J. F. Williams, Ig. R. Ark., p. 276, 1891.	Leucite syenite (arkite).	In W. T., p. 405.
2	Serra de Tingua, Brazil.	E. Hussak.	E. Hussak, N. J., II, p. 146, 1892.	Leucite tinguaite.	In W. T., p. 207.
3	Pocos de Caldas, Minas Geraes, Brazil.	F. W. Dafert.	E. Hussak, N. J., II, p. 149, 1892.	Leucitophyre.	In W. T., p. 303.
4	Engeler Kopf, near Laacher See, Rheinland.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn., XLVIII, p. 236, 1891.	Leucite phonolite.	In W. T., p. 211.
5	Tabellario, Monte Mattone, Rocca Monfina, Italy.	A. Galdieri.	A. Galdieri, Rend. Ac. Sci. Nap., XIX, p. 111, 1913.	Hauyne-leucite phonolite.	
6	Namlagira, Lake Kivu District, German East Africa.	O. Hauser.	O. Hauser, D. Zent. Af. Exp., I, p. 50, 1912.	Leucite basanite.	
7	Gaussberg, Kaiser Wilhelm Land, Antarctica.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (1), p. 84, 1906.	Augite-leucite nodule.	In leucite basalt.
8	Gaussberg, Kaiser Wilhelm Land, Antarctica.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (1), p. 84, 1906.	Olivine-leucite augite nodule.	In leucite basalt.

LIMBURGITE.

1	Kleinostheim, Spessart, Bavaria.	Stöhr.	H. Bücking, Abh. Pr. G. L.-A., XII, p. 212, 1892.	Limburgite.	Not in W. T.
2	Doloy Nor, Manchuria.	P. Venukoff.	P. Venukoff, B. Soc. Belg. G., II, p. 446, 1888.	Limburgite.	

PYROXENITE, ETC.

1	Escourgeat, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int., VIII, C. R., p. 833, 1901.	Ariegite.	In W. T., p. 335.
2	Etang de Lherz, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int., C. R., VIII, p. 833, 1901.	Ariegite.	In W. T., p. 235.
3	Etang de Lherz, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int., VIII, C. R., p. 833, 1901.	Ariegite.	In W. T., p. 237.
4	Etang de Lherz, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int., VIII, C. R., p. 832, 1901.	Ariegite.	In W. T., p. 337.
5	Etang de Lherz, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int., VIII, C. R., p. 833, 1901.	Ariegite.	In W. T., p. 339.
6	Etang de Lherz, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int., VIII, C. R., p. 833, 1901.	Ariegite.	In W. T., p. 339.
7	Lherz, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int., VIII, C. R., p. 833, 1901.	Ariegite.	In W. T., p. 347.

PYROXENITE, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
8 A3. III	46.56	13.04	2.83	9.92	15.31	10.10	1.13	0.45	0.42		trace	0.25	0.16	S trace	100.17	
9 A3. III	43.85	9.07	n. d.	10.75	23.40	7.90	1.30	0.54	1.62		1.88	0.38			100.69	

IRON ORES, ETC.

1 A3. III	9.40	7.18	52.93	21.65	1.62	6.00	n. d.	n. d.	0.20		n. d.	0.33	0.20	SO ₃ 0.12 S 0.05 Cu 0.01	99.69	
2 B2. III	4.24	3.45	43.34	18.61	0.66	5.48	0.15	0.45	1.62	0.51	16.48	4.98	0.12	CO ₂ trace Cl trace F 0.26 S trace	100.24	

PYROXENITE, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
8	Schollnitz, Brunn, Moravia.	v. John.	v. John and Suess, Jb. G. R.-A. Wien., LVIII, p. 249, 1908.	Hornblendite.	
9	Papenoo Valley, Tahiti, Society Islands.	Pisani.	A. Lacroix, B. Soc. G. Fr., X, p. 119, 1910.	Feldspathic picrite.	

IRON ORES, ETC.

1	Goroblagodat, Ural Mountains.	D. J. Mendelejeff.	Cited in Beck and Weed, Ore Deposits, I, p. 19, 1905.	Iron ore.	In syenite.
2	Lovington, Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, Va. G. S. B. III, A, p. 125, 1913.	Biotite nelsonite.	CaO low or P ₂ O ₅ high.

PART III.—SUPERIOR ANALYSES OF ALTERED ROCKS AND TUFFS.

GRANITE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 A3. III	58.84	11.24	n. d.	0.47	0.35	12.17	6.91	none	0.40		0.26			CO ₂ 9.84 S 0.13	100.61	
2 A3. III	70.18	15.13	0.68	1.54	none	0.84	2.67	8.93	0.22	0.10			0.13		100.42	
3 A2. II	67.33	16.20	1.40	2.73	1.31	2.81	3.15	2.14	1.84		0.80	0.16	trace	BaO 0.05	99.92	
4 A2. II	73.52	12.86	1.48	1.54	0.57	2.08	4.36	1.41	1.21	0.35	0.51	0.07	0.08	SO ₃ none S none NiO 0.02	100.06	
5 A3. III	66.82	15.62	1.88	1.69	2.76	3.13	2.58	2.04	3.27						99.79	
6 A4. IV	74.53	13.70	1.15	n. d.	trace	0.95	4.41	5.20	0.81						100.75	
7 A4. IV	73.48	14.78	1.30	n. d.	trace	0.31	3.43	5.00	2.42						100.72	
8 A4. IV	71.67	16.14	1.22	n. d.	0.10	0.29	2.80	4.52	4.03						100.77	
9 A4. IV	70.50	16.84	1.53	n. d.	0.18	1.15	4.47	4.52	1.06						100.25	
10 A4. IV	67.92	17.55	1.53	n. d.	0.32	0.99	3.57	5.43	3.17						100.48	
11 A4. IV	67.87	18.08	1.91	n. d.	0.79	2.28	4.32	4.52	0.63						100.40	
12 A4. IV	60.94	23.29	2.44	n. d.	0.43	0.04	2.18	3.57	8.03						100.92	
13 A4. IV	56.99	26.02	1.91	n. d.	0.17	0.75	1.91	2.40	9.76						99.91	
14 A4. IV	56.40	25.62	3.45	n. d.	0.98	0.37	1.36	2.99	9.18						100.35	
15 A4. IV	54.57	25.90	4.69	n. d.	0.21	0.05	2.16	2.87	10.14						100.59	
16 A4. IV	51.29	29.69	6.33	n. d.	0.14	0.07	1.12	1.50	10.36						100.50	
17 A2. II	68.36	13.76	2.65	2.75	0.68	0.70	3.56	4.48	0.98		1.57	0.33	trace	SO ₃ 0.66 Li ₂ O none	100.48	
18 A1. I	59.58	16.00	0.30	0.65	0.03	2.03	0.98	11.93	0.81	0.32	0.75	0.32	trace.	CO ₂ 0.26 SO ₃ none F 0.09 FeS ₂ 4.73 V ₂ O ₅ 0.39 BaO 0.11 SrO 0.01 MoO ₃ 0.01	99.95	

GRANITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	James Township, Nipissing, Ontario.	N. L. Bowen.	R. E. Hore, J. G., XVIII, p. 275, 1910.	Aplitic soda granite.	
2	Mount Kearsarge, New Hampshire.	J. H. Perry.	J. H. Perry, J. G., XI, p. 406, 1903.	Granite.	"Particles" in weathered granite.
3	East Clarendon, Vermont.	H. N. Stokes.	U. S. G. S. B. 148, p. 71, 1897.	Chloritic granite.	
4	Barnes Hill, North Stonington, Connecticut.	G. Steiger.	G. F. Loughlin, U. S. G. S. B. 492, p. 114, 1912.	Granite.	
5	Near Pierce's Mill, Broad Branch, District of Columbia.	R. L. Packard.	G. P. Merrill, B. G. S. A., VI, p. 323, 1895.	Granite.	Decomposed. Cf. No. 8, p. 751.
6	Lithonia, DeKalb County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 140, 1902.	Granite gneiss.	Altered from No. 50, I.4.2.3.
7	Lithonia, DeKalb County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 134, 1902.	Granite gneiss.	Altered from No. 37, I.4.1.3.
8	Lithonia, DeKalb County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 134, 1902.	Granite gneiss.	Altered from No. 37, I.4.1.3.
9	Lexington, Oglethorpe County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 189, 1902.	Granite.	Altered from No. 46, I.4.1.3.
10	Oglesby, Elbert County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 217, 1902.	Granite.	Altered from No. 60, I.4.2.3.
11	Appling, Columbia County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 236, 1902.	Granite.	Weathered from No. 59, I.4.2.3.
12	Oglesby, Elbert County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 217, 1902.	Granite.	Altered from No. 60, I.4.2.3.
13	Newnan, Coweta County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 87, 1902.	Granite.	Weathered from No. 21, I.4.2.4.
14	Camak, Warren County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 228, 1902.	Granite gneiss.	Weathered from No. 10, p. 751.
15	Greenville, Meriwether County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 75, 1902.	Granite.	Weathered from No. 58, I.4.2.3.
16	Greenville, Meriwether County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 75, 1902.	Granite.	Weathered from No. 58, I.4.2.3.
17	Pigeon Point, Minnesota.	J. E. Whitfield.	W. S. Bayley, U. S. G. S. B. 109, p. 90, 1893.	Granite.	Altered. In W. T., p. 147.
18	Ajax Mine, Cripple Creek, Colorado.	W. F. Hillebrand.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 194, 1906.	Granite.	Altered.

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
19 A2. II	72.42	10.47	0.83	5.50	0.41	2.53	1.93	2.94	1.11	0.06	0.68	0.11	0.16	CO ₂ 0.61 SO ₃ none F 0.25 S none	99.76	2.728
20 A3. III	72.69	13.42	0.97	0.32	0.26	1.97	0.21	3.36	2.60	2.36	trace	trace	trace	CO ₂ 0.97 SO ₃ none F 0.25 S none	99.38	
21 A3. III	71.38	14.31	0.66	0.28	0.25	2.22	0.15	3.79	3.03	1.60	trace	trace	trace	CO ₂ 1.42 SO ₃ none F 0.17 S none	99.26	
22 A1. I	63.56	11.72	4.90	1.10	3.65	4.12	6.44	2.30	0.81		0.18	trace	0.24	CO ₂ 0.79 ZrO ₂ trace Cl 0.06 S none CoO 0.08 BaO 0.01 Cu 0.03 Pb none	99.99	
23 A3. III	68.99	18.29	2.10	1.62	0.40	4.75	3.15	0.09	0.14		trace	trace	none	CO ₂ 1.10 S trace Cu none	100.63	
24 A1. I	65.75	15.56	0.64	3.30	1.77	3.75	3.11	4.11	0.69	0.08	0.66	0.06	0.07	CO ₂ 0.74 ZrO ₂ 0.06 BaO 0.06	100.41	2.716
25 A2. II	72.51	13.10	2.81	0.90	0.20	1.84	6.76	0.33	0.35	0.04	0.31	0.06	0.20	CO ₂ 0.76	100.17	
26 B3. IV	65.68	13.49	0.56	0.28	0.31	6.28	0.13	5.85	1.24					CO ₂ 5.28	99.10	
27 A1. I	71.15	19.41	1.32	0.09	0.45	0.21	0.05	1.44	5.09	0.16	0.16	0.07	0.09	Cl trace F 0.11 Li ₂ O 0.03 B ₂ O ₃ 0.33	100.16	
28 A1. I	65.67	13.72	0.50	1.17	1.52	3.21	6.26	1.68	1.84	0.28	0.19	0.09	0.13	CO ₂ 4.86 FeS ₂ 0.03 NiO 0.02 BaO 0.04	100.21	
29 A3. III	71.22	14.92	2.36	0.07	0.68	0.44	4.25	4.10	2.10				0.20		100.34	2.60
30 A4. IV	71.90	18.10	trace	none	0.36	1.53	3.37	2.38	2.25						99.89	
31 A2. II	66.80	16.80	0.40	5.22	1.45	0.39	2.01	3.30	2.60		0.91	0.06			99.94	
32 A3. III	74.66	14.32	1.49	0.24	trace	0.12	1.17	5.89	1.96		trace	trace			99.85	
33 A4. IV	68.40	16.26	1.92	n. d.	0.27	1.15	6.03	4.64	1.62		0.40				100.29	
34 A3. III	63.24	16.63	4.45	0.40	1.50	0.90	1.72	7.73	3.24			0.30		CO ₂ 0.28	100.39	
35 A3. III	75.65	12.02	0.20	trace	1.04	1.16	3.13	5.60	1.10				trace		99.90	2.60
36 A4. IV	75.26	13.32	2.02	trace	0.34	trace	3.72	4.57	0.79				trace		100.02	2.63

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
19	Moyie Sill, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38, (1), p. 230, 1912.	Granite.	
20	Tonopah, Nevada.	W. F. Hillebrand.	J. E. Spurr, Ec. G., I, p. 375, 1906.	Granite.	Altered.
21	Tonopah, Nevada.	W. F. Hillebrand.	J. E. Spurr, Ec. G., I, p. 375, 1906.	Granite.	Altered.
22	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Gui., p. 40, 1908.	Granite gneiss.	
23	Kumaka, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Brit. Gui., p. 194, 1908.	Alaskite.	
24	Olavarria, near Buenos Aires, Argentina.	M. Dittrich.	H. Backlund, Minist. Agric. Arg. B. 2 B, p. 26, 1913.	Granite gneiss.	
25	Tayvallich, Argyllshire, Scotland.	E. G. Radley.	Dewey and Flett, G. Mag. (V), VIII, p. 209, 1911.	Soda granite.	
26	Foxdale, England.	A. M. Finlayson.	A. M. Finlayson, Q. J. G. S., LXVI, p. 304, 1910.	Granite.	Cf. No. 176, I.4.2.3.
27	Georgia Works, Lands End, Cornwall.	W. Pollard.	Reid and Flett, G. S. Eng. Mem., S.h. 351, p. 59, 1907.	Granite.	Kaolinized.
28	Gallentreath, Porthallow, Cornwall.	E. G. Radley.	Dewey and Flett, G. Mag. (V), VIII, p. 209, 1911.	Soda granite.	Also in G. S. Eng. Mem. sh. 359, p. 187, 1912.
29	Fort Regent, St. Helier, Jersey, Channel Islands.	P. Holland.	Holland and Dickson, Pr. Liverp. G. Soc., VII, p. 116, 1897.	Granite.	Weathered. Not in W. T.
30	Gardeolles, Dauphiny, France.	Rüst.	P. Termier, B. Soc. G. Fr., XXVII, p. 407, 1899.	Microgranite.	Not in W. T.
31	Jensserie, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 145, 1913.	Granite.	Not fresh.
32	Eisenbach, Schwarzwald.	M. Dittrich.	M. Dittrich, Mt. Bad. G. L.-A., V (1), p. 8, 1907.	Granite.	Weathered.
33	Altglashütten, Schwarzwald.	Frick.	S. v. Bubnoff, Mt. Bad. G. L.-A., VII, p. 369, 1912.	Granite.	Altered.
34	Heiligkreutz, Neckarthal, Baden.	M. Dittrich.	M. Dittrich, Mt. Bad. G. L.-A., IV (2), p. 204, 1901.	Granite.	Weathered. Cf. No. 32. II.4.2.3.
35	Gottlob, Thuringia.	Müklenberg.	Müklenberg, In. Diss. Halle, 1908.	Granite.	Pebble in con- glomerate. Not fresh. Osann, III (1), p. 5.
36	Gottlob, Thuringia.	Müklenberg.	Müklenberg, In. Diss. Halle, 1908.	Granite.	Pebble in conglomerate not fresh. Osann, III (1), p. 4.

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
37 A3. III	62.41	16.79	4.54	0.26	2.44	5.39	3.73	2.64	0.80					CO ₂ 1.57	100.57	
38 B3. IV	72.0	16.0	1.0	0.2	1.9	3.4	2.0	1.9	1.2						99.6	
39 A3. III	60.39	20.51	3.98	3.16	1.11	2.63	2.67	3.84	1.85						100.14	
40 A3. III	57.65	24.59	2.50	3.36	1.93	0.63	1.99	4.71	2.68						100.04	2.77
41 B3. IV	57.42	24.44	3.75	3.08	1.47	0.70	1.22	5.10	2.11						99.29	
42 A3. III	55.79	24.91	3.18	3.62	0.98	0.84	2.40	5.05	2.94						99.71	2.76
43 A3. III	75.13	14.61	0.32	0.54	0.63	1.43	3.77	2.95	0.16		trace		trace		99.54	
44 A3. III	72.99	16.83	1.38	1.22	0.48	0.82	2.38	3.72	0.47		trace				100.29	
45 A3. III	70.53	15.79	2.08	2.15	0.47	1.81	3.47	3.67	0.29						100.26	
46 B3. IV	67.99	12.94	1.47	2.38	0.61	4.42	3.70	3.37	1.15	0.12				CO ₂ 2.80	100.95	2.656
47 A4. IV	71.60	13.05	1.34	n. d.	3.65	0.90	2.28	3.86	2.09	1.60	0.25	trace		S trace	100.62	
48 A4. IV	70.34	13.64	1.04	n. d.	0.09	0.59	1.23	0.18	12.52		(0.24)			F 0.35	100.22	2.613
49 A2. II	60.98	15.64	4.28	1.80	1.60	4.62	5.25	3.79	1.00		0.41	0.36			99.93	2.659
50 A3. III	69.97	18.74	1.04	0.43	0.81	0.15	0.59	5.82	1.79	0.05	0.64		trace	CO ₂ none	100.03	2.69

QUARTZ PORPHYRY.

1 A3. III	78.06	12.88	0.74	0.73	0.86	0.44	1.55	2.67	1.88	0.25					100.06	
2 A3. III	70.37	11.27	0.80	2.58	2.03	2.31	2.63	1.86	1.96	3.60	0.17				99.58	
3 A1. I	63.00	17.92	0.50	0.90	0.93	1.50	5.93	6.08	0.50	0.06	0.48	0.05	0.03	CO ₂ 1.15 SO ₃ 0.03 Cl 0.27 FeS ₂ 0.50 BaO 0.02	99.85	
4 A3. III	65.22	14.62	3.39	1.14	1.09	3.01	5.66	1.45	1.07					CO ₂ 2.61 S 0.79	100.05	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
37	Schneidermüllers Kopf, Thuringia.	Zschimmer.	Zschimmer, In. Diss. Jena, 1898.	Granite.	Not in W. T. Osaan, III (1), p. 5.
38	Muchow, Isergebirge, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 164, 1902.	Granite.	Altered. Cf. No. 14. I.3.3.3.
39	Pulenzitz, near Eichberg, Lausitz.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 27, 1902.	Granite.	Altered.
40	Innozenzidorf, Lausitz.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 26, 1902.	Granite.	Altered. Cf. No. 35, I.4.3.3.
41	Klotsche, Lausitz.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 27, 1902.	Granite.	Altered. Cf. No. 254, I.4.2.3.
42	Kohlhaustrasse, Lausitz.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 26, 1902.	Granite.	Altered. Cf. No. 256, I.4.2.3.
43	Aranyida, Abauj-Torua, Hungary.	P. Rozlozsnik.	B. V. Horvath, Jb. Ung. G. R.-A. (1910), p. 370, 1912.	Granite.	Not fresh.
44	Aranyida, Abauj-Torua, Hungary.	P. Rozlozsnik.	B. V. Horvath, Jb. Ung. G. R.-A. (1910), p. 365, 1912.	Granite gneiss.	Metamorphosed.
45	Reka, Abauj-Torua, Hungary.	P. Rozlozsnik.	B. V. Horvath, Jb. Ung. G. R.-A. (1910), p. 366, 1912.	Granite.	Not fresh.
46	Gasteren, Aarmassif, Switzerland.	L. Duparc.	E. v. Fellenburg, Btr. G. Kt. Schw., XXI, p. 45, 1893.	Granite.	Not in W. T.
47	Cava d'Oggi, San Piero in Campo, Elba.	G. d'Acchiardi.	G. d'Acchiardi, Mem. G. d'Acch., p. 115, 1903.	Granite.	Altered.
48	Kysseyr Dagh, Karabagh District, Armenia.	A. Röhrig.	C. R. Thost, Abh. Senk. Nat. Ges., XVIII, p. 219, 1894.	Granite.	Altered. In W. T., p. 379.
49	Kedabeg, Karabagh District, Armenia.	A. Röhrig.	C. R. Thost, Abh. Senk. Nat. Ges., XVIII, p. 221, 1894.	Augite granite.	Not fresh. In W. T., p. 265.
50	Boodalyerri, Pilbara, Western Australia.	E. S. Simpson.	A. G. Maitland, W. Aust. G. S. B. 15, p. 12, 1904.	Granite.	Altered.

QUARTZ PORPHYRY.

1	Red Islands, Richmond County, Nova Scotia.	F. G. Wait.	F. G. Wait, Can. G. S. A. R. (1900), p. 23R, 1903.	Felsite.	Altered.
2	Suffield, Quebec.	M. F. Connor.	J. A. Dresser, B. G. S. A., XVII, p. 504, 1906.	Quartz porphyry.	Altered. Also in Can. G. S. Rep. 974, p. 23, 1907.
3	Mount Royal, Montreal, Quebec.	M. F. Connor.	F. D. Adams, Cong. G. Int., XII, Guide 3, p. 46, 1913.	Aplite.	
4	Preston East Dome, Porcupine, Ontario.	Not stated.	A. G. Burrows, Rep. Bur. Min. Ont., XXI (1), p. 213, 1912.	Quartz porphyry.	

QUARTZ PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5 A2. II	58.84	11.24	n. d.	0.48	0.35	12.17	6.91	0.07	0.40		0.46			CO ₂ 9.84 S 0.13 BaO none	100.68	
6 B3. IV	52.68	16.29	2.58	3.08	3.31	5.46	8.11	0.87	0.44	0.06	7.72	0.31			101.11	
7 A2. II	68.13	17.49	1.19	1.38	1.00	0.75	3.50	3.00	2.06	0.03	0.74	trace	0.30	S 0.22	99.79	
8 A3. III	66.69	16.69	2.06	0.93	1.15	1.40	2.46	5.23	1.70					CO ₂ 1.42	99.73	
9 A3. III	80.05	9.73	1.72	0.18	none	0.83	2.19	4.43	1.03				trace		100.16	
10 A1. I	69.68	14.97	0.79	0.34	0.66	2.10	3.38	4.40	0.92	1.10	0.28	0.17	trace	CO ₂ 0.88 SO ₃ trace Cl trace BaO 0.14 SrO 0.06	99.86	
11 A1. I	57.98	19.32	0.44	0.83	1.93	8.87	3.62	4.01	0.67	0.57	0.66	0.17	0.07	CO ₂ 0.53 ZrO ₂ 0.04 Cl 0.17 F 0.07 S 0.01 Cr ₂ O ₃ none BaO 0.12 SrO 0.05	100.13	
12 A3. III	70.74	14.68	0.69	0.58	0.28	4.12	2.29	2.59	2.09				0.06	CO ₂ 2.14 Cl trace BaO 0.03 SrO trace	100.29	2.680
13 A3. III	65.94	16.00	0.60	1.74	1.02	2.87	3.85	4.56	1.13			0.23		CO ₂ 1.55 FeS ₂ 0.60	100.26	2.672
14 A1. I	62.92	14.29	0.84	4.66	3.14	2.72	4.30	1.39	2.84	0.22	0.84	0.13	0.15	CO ₂ 1.24 FeS ₂ 0.32 NiO trace BaO 0.10 SrO trace	100.10	
15 A3. III	83.73	9.83	none	0.64	0.04	0.21	3.52	0.61	0.85	0.82				CO ₂ none	100.25	
16 A3. III	77.63	12.33	0.42	1.26	0.01	0.41	3.88	3.75	0.42	0.13				CO ₂ none	100.24	
17 A3. III	76.80	12.27	0.72	1.64	1.17	0.71	4.34	1.26	1.13	0.20				CO ₂ 0.14	100.38	
18 A3. III	76.47	13.90	0.18	0.40	1.74	0.19	4.76	0.65	1.34	0.29				CO ₂ none	99.92	
19 A3. III	72.53	14.90	1.57	1.84	2.56	0.23	0.63	1.91	3.62	0.23				CO ₂ none	100.02	
20 A4. IV	73.25	13.25	n. d.	1.74	0.28	2.23	2.69	3.79	1.03	0.07	trace	trace	trace	CO ₂ 1.05 FeS ₂ 0.58 BaO trace SrO trace	99.96	
21 A3. III	70.29	11.83	1.30	2.08	1.24	2.30	2.68	3.05	1.35	0.10	0.29	0.07	0.12	CO ₂ 3.25 BaO 0.07 SrO trace	100.02	
22 A2. II	75.62	14.05	0.33	2.82	0.40	2.79	1.97	0.44	0.26		trace	0.01	trace	CO ₂ 0.93 FeS ₂ 0.06	99.68	

QUARTZ PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	James Township, Cobalt, Ontario.	N. L. Bowen.	N. L. Bowen, J. Can. Min. Inst., XII, p. 523, 1910.	Aplite.	Calcite from limestone?
6	Hearst Township, Nipissing District, Ontario.	M. F. Connor.	M. E. Wilson, Can. G. S. Mem. 39, p. 116, 1913.	Aplite.	Altered.
7	Seminole Mine, Lincoln County, Georgia.	E. Everhardt.	S. P. Jones, Ga. G. S. B. 19, p. 57, 1909.	Quartz-albite porphyry.	Altered. Cf. No. 1, II.4.1.5.
8	Upper Quinnesec Falls, Menominee River, Wisconsin.	R. B. Riggs.	G. H. Williams, U. S. G. S. B. 62, p. 121, 1890.	Quartz porphyry.	Altered and schistose. In W. T., p. 161.
9	Mount Houghton, Keweenaw Point, Michigan.	F. P. Burrall.	L. L. Howard, G. S. Mich., VI (II), p. 42, 1898.	Felsite.	Not in W. T.
10	Wolf Butte, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, U. S. G. S. A. R. 20 (III), p. 499, 1900.	Granite porphyry.	
11	Foster Creek, Philipsburg quadrangle, Montana.	W. F. Hillebrand.	Emmons and Calkins, U. S. G. S. P. P. 78, p. 124, 1913.	Pyroxene aplite.	Contains much scapolite.
12	Leadville, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. Mon. 12, p. 332, 1886.	Porphyry.	In W. T., p. 139
13	Jefferson Tunnel, Leadville, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. B. 148, p. 176, 1897.	Granite porphyry.	In W. T., p. 163.
14	Bear Creek, Cooks Inlet, Alaska.	W. F. Hillebrand.	G. F. Becker, U. S. G. S. A. R. 18, III, p. 45, 1898.	Quartz porphyry.	In W. T., p. 225.
15	Bully Hill, Shasta County, California.	C. Palmer.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Granite porphyry.	Altered.
16	Bully Hill District, Shasta County California.	R. C. Wells.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Granite porphyry.	Altered.
17	Shasta King Mine, Shasta County, California.	C. Palmer.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Granite porphyry.	Altered. Cf. No. 2, 1.3.1.5.
18	Clipper Mine, Shasta County, California.	C. Palmer.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Granite porphyry.	Silicified.
19	Iron Mountain Mine, Shasta County, California.	C. Palmer.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Granite porphyry.	Altered.
20	Tower Rock, Grizzly Mountains, Plumas County, California.	W. F. Hillebrand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 484, 1894.	Quartz porphyry.	In W. T., p. 165.
21	Buena Vista Park, Amador County, California.	W. F. Hillebrand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 484, 1894.	Quartz porphyry schist.	In W. T., p. 133.
22	Mahdiana Workings, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 195, 1908.	Granophyre.	Altered.

QUARTZ PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
23 A1. I	71.33	11.18	3.96	1.45	0.88	2.10	3.51	3.49	0.92		0.12	trace	0.32	CO ₂ 0.74 ZrO ₂ none Cl 0.09 FeS ₂ 0.04 BaO 0.03 Cu, Pb none	100.16	
24 A1. I	68.14	12.39	0.96	3.84	1.38	2.36	3.08	0.59	2.63		0.33	trace	0.44	CO ₂ 1.56 ZrO ₂ none Cl 0.01 FeS ₂ 2.35 BaO 0.08 CuO trace	100.14	
25 A2. II	57.96	17.43	0.45	1.82	2.34	5.07	5.17	0.45	1.04		1.21	0.20		CO ₂ 6.32 FeS ₂ 0.33	99.61	
26 A3. III	75.93	13.26	1.47	0.68	none	1.11	3.13	3.19	0.44		trace		trace	CO ₂ 0.51	99.72	
27 A2. II	78.39	9.26	3.17	0.57	0.03	1.30	3.52	1.44	0.63		0.47	none	0.30	CO ₂ 1.06 F none	100.14	
28 A2. II	70.81	14.31	2.06	0.84	0.67	0.85	6.22	2.15	0.55		0.25	0.06	0.03	CO ₂ 0.88 S 0.02	99.70	
29 A2. II	66.46	15.08	3.09	1.33	0.70	1.76	6.40	2.74	0.65		0.49	0.07	0.04	CO ₂ 1.22 S 0.04	100.07	
30 A2. II	66.66	14.15	5.10	0.25	0.47	1.40	4.09	6.32	0.36		0.60	0.11	0.06	CO ₂ 0.62 S 0.04 BaO 0.02	100.25	
31 A2. II	52.55	15.39	5.61	9.10	2.19	5.46	5.80	1.19	1.07	0.40	1.23	0.12	0.22	S 0.10 BaO trace	100.36	
32 A2. II	75.78	11.22	0.56	2.54	0.53	0.95	2.14	4.08	1.26		0.31			CO ₂ 1.16 SO ₃ 0.12	100.82	
33 A2. II	70.88	15.15	3.22	0.55	0.53	0.21	0.23	5.51	2.72		0.32	0.26		SO ₃ 0.17	99.75	2.685
34 A2. II	65.00	13.73	0.44	2.19	0.82	4.43	3.70	4.82	1.08		0.47	0.08	trace	CO ₂ 3.15 SO ₃ 0.21	100.12	2.622
35 A2. II	64.55	13.62	1.23	1.24	0.67	5.07	3.48	4.13	1.90		0.29	0.10		CO ₂ 3.70 SO ₃ 0.05	100.03	2.593
36 A2. II	60.45	15.93	2.57	2.90	1.62	2.77	4.29	2.77	3.28		1.17	0.21		CO ₂ 1.77 SO ₃ 0.10 Org. 0.03	99.86	2.643
37 A2. II	62.20	14.69	3.83	0.43	1.86	2.91	2.82	5.03	2.47		0.52	0.20		CO ₂ 3.35 SO ₃ 0.12	100.43	2.631
38 A2. II	66.86	17.41	0.40	1.27	0.51	5.37	1.21	3.69	0.24		0.97	0.51	0.73	CO ₂ 0.82 SO ₃ trace	99.99	6.655
39 B2. III	65.01	15.12	1.84	1.91	1.75	2.97	3.56	3.54	0.64	0.03	0.91	1.02		CO ₂ 0.75 SO ₃ 0.88	99.13	
40 B2. III	64.20	10.52	1.48	1.00	2.20	4.39	4.00	3.07	1.96		0.96	0.08	1.32	CO ₂ 5.92	101.10	
41 A2. II	69.51	12.47	1.57	0.36	0.66	1.74	3.02	6.29	1.93	1.27	1.02	0.06	0.17	F 0.03	100.10	

QUARTZ PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
23	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 60, 1908.	Quartz porphyry.	In W. T., p. 127.
24	Omai, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 191, 1908.	Aplite.	Altered.
25	Omai, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 191, 1908.	Aplite.	Much altered.
26	Tamaya, Chile.	C. Schwarz.	v. Groddeck, Z. D. G. G., XXXIX, p. 249, 1887.	Quartz porphyry.	Not fresh. In W. T., p. 133.
27	Konnerud Kollen, n. Christiania, Norway.	O. N. Heidenreich.	V. M. Goldschmidt, Kont. Metam. Krist. Gest., p. 75, 1911.	Quartz porphyry.	
28	Luossavaara, Lapland, Sweden.	G. Nyblom.	P. Geijer, G. Kir. Dist., p. 132, 1910.	Quartz porphyry.	
29	Luossavaara, Lapland, Sweden.	G. Nyblom.	P. Geijer, G. Kir. Dist., p. 132, 1910.	Quartz porphyry.	
30	Kvarnap, Lake Vättern, Smaland, Sweden.	R. Mauzelius.	A. Gavelin, Sv. G. Und., Arsb. 5, No. 3, p. 22, 1912.	Quartz orthophyre.	
31	Norrsand, N. Ulfön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 167, 1913.	Aplitic dike.	
32	Near Röspe, Westphalia.	Gremse.	O. Mücke, N. J. B. B., VIII, p. 577, 1893.	Quartz porphyry tuff.	In W. T., p. 381.
33	Alvensleben, n. Magdeburg, Russia.	Hampe.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 196, 1892.	Quartz porphyry tuff.	In W. T., p. 381.
34	Norheim, Nahe Valley, Rhineland.	Hesse.	K. A. Lossen, Z. D. G. G., XLIII, p. 537, 1891.	Quartz porphyry.	In W. T., p. 223.
35	Munster am Stein, Nahe Valley, Rheinland.	Böttcher.	K. A. Lossen, Z. D. G. G., XLIII, p. 537, 1891.	Granite porphyry.	In W. T., p. 169.
36	Munster am Stein, Nahe Valley, Rhineland.	Gremse.	K. A. Lossen, Z. D. G. G., XLIII, p. 537, 1891.	Quartz porphyry.	In W. T., p. 181.
37	Near Karlshalle, Kreuznach, Rhineland.	Böttcher.	K. A. Lossen, Z. D. G. G., XLIII, p. 537, 1891.	Quartz porphyry.	In W. T., p. 169.
38	Nieder Modau, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kt. Hes., Bl. Rossdorf, p. 44, 1886.	Granite porphyry.	In W. T., p. 139.
39	Hühnersbusch, n. Rossdorf, Hesse.	F. Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 58, 1912.	Granite porphyry.	Center of dike. Cf. No. 33, II.4.2.3.
40	Bistrich Wald, Pfalz, Bavaria.	A. Schwager.	E. Düll, Geog. Jhft., XVII, p. 66, 1906.	Quartz porphyry.	
41	Zalas, n. Cracow, Galicia.	Z. Rosen.	Z. Rosen, B. Ac. Sc. Crac. (2), p. 818, 1909.	Porphyry.	

QUARTZ PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
42 A2. II	69.32	14.37	2.72	0.35	0.35	0.93	1.11	6.82	1.35	2.11	0.69	0.12	trace	CO ₂ trace	100.15	2.583
43 A3. III	82.21	12.58	trace		0.12	0.31	0.34	0.88	2.34		1.06				99.83	
44 A3. III	65.49	14.40	4.19	1.41	0.98	2.93	7.70	0.18	0.19	0.96				CO ₂ 1.05	99.48	
45 A3. III	76.93	14.35	0.85	0.23	0.12	1.29	2.71	0.60	1.01					CO ₂ 1.71	99.80	
46 A3. III	76.41	14.42	0.48	0.74	0.24	1.43	0.63	3.88	1.02					CO ₂ 1.40	100.65	
47 A3. III	67.77	12.30	1.63	1.20	1.07	4.45	0.51	4.93	1.74					CO ₂ 4.54	100.14	
48 A3. III	71.31	13.82	0.77	1.70	0.51	1.61	3.35	4.14	1.04		trace			CO ₂ 1.87	100.12	
49 A3. III	90.60	0.07	3.15	1.15	0.58	0.08	0.70	0.16	2.70	0.11					99.30	
50 A3. III	89.49	4.88	4.24	0.05	0.32	0.04	0.25	0.08	1.24	0.22					100.81	
51 A3. III	87.96	3.75	3.89	0.69	0.23	0.08	0.39	0.11	3.18	none					100.28	
52 A1. I	70.40	13.13	1.25	1.75	0.64	2.74	3.47	2.22	1.35	0.15	0.30	0.08	0.04	CO ₂ 2.83 ZrO ₂ none SO ₃ trace Cl none Cr ₂ O ₃ none NiO none BaO 0.04 SrO trace Li ₂ O trace Cu trace	100.39	2.688
53 A1. I	63.54	15.07	1.90	3.51	2.82	3.10	2.49	3.15	2.40	0.22	0.55	0.13	0.08	CO ₂ 1.32 ZrO ₂ none SO ₃ none Cl none Cr ₂ O ₃ none NiO none BaO 0.11 SrO trace	100.39	2.701
54 A2. II	70.92	12.77	trace	4.62	0.33	1.46	3.32	3.92	0.54	0.08	0.56		0.17	CO ₂ 0.85 FeS ₂ 0.10	99.64	2.67

RHYOLITE.

1 A3. III	74.55	10.75	1.24	2.11	trace	1.50	5.39	2.70	0.61					CO ₂ 1.30	100.15	
2 A2. II	73.12	14.27	0.51	0.26	0.24	1.10	3.43	4.90	0.73	0.68	0.08	0.03	0.06	CO ₂ 0.77 BaO trace SrO trace Li ₂ O trace	100.18	
3 A4. IV	71.01	14.37	0.18	0.26	0.58	0.10	1.56	4.53	n. d.		0.24			FeS ₂ 4.37	97.20	
4 A3. III	68.68	12.69	1.14	1.17	1.14	1.11	1.23	5.58	7.99						100.73	

QUARTZ PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
42	Miekinia, n. Cracow, Galicia.	Z. Rosen.	Z. Rosen, B. Ac. Sc. Crac. (2), p. 813, 1909.	Quartz porphyry.	
43	Petroszatatő, n. Kazanesd, Hunyad, Hungary.	K. Emszt.	P. Rozlozsnik, F. K., XXXV, p. 528, 1905.	Quartz porphyry.	Altered. 3 decimals.
44	Hidas, Tur-Toroczko Range, Hungary.	S. v. Szentpetry.	S. v. Szentpetry, Muz. Füz. I, p. 238, 1912.	Aplite.	
45	Schwarzthal, Windgälle Mountains, Switzerland.	Serda.	C. Schmidt, N. J. B. B., IV, p. 432, 1886.	Quartz porphyry.	Schistose. In W. T., p. 123.
46	Käserngrat, Windgälle Mountains, Switzerland.	C. Schmidt.	C. Schmidt, N. J. B. B., IV, p. 432, 1886.	Quartz porphyry.	In W. T., p. 131.
47	Bolsjoj Pit River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 442, 1910.	Quartz porphyry.	
48	Semenow Mountain, Kuké Nor, China.	C. Pfeil.	K. Futterer, Durch Asien, II (2), p. 102, 1909.	Quartz porphyry.	
49	Mancayan, Luzon, Philippine Islands.	L. S. Salinger.	A. J. Eveland, Min. Bur. Manila B. 4, p. 42, 1905.	Quartz porphyry.	Altered.
50	Mancayan, Luzon, Philippine Islands.	L. S. Salinger.	A. J. Eveland, Min. Bur. Manila B. 4, p. 42, 1909.	Quartz porphyry.	Altered.
51	Mancayan, Luzon, Philippine Islands.	L. S. Salinger.	A. J. Eveland, Min. Bur. Manila B. 4, p. 42, 1905.	Quartz porphyry.	Altered.
52	Jenolan Caves, New South Wales.	W. G. Stone.	G. W. Card, pers. com.	Quartz felsite.	
53	Colong, Yerranderrie, New South Wales.	Not stated.	N. S. W. Dep. Min. A. R. (1909), p. 198, 1910.	Quartz felsite.	
54	Bamboo Creek, Pilbara, West Australia.	E. S. Simpson.	A. G. Maitland, W. Aust. G. S. B. 15, p. 12, 1904.	Quartz felsite.	

RHYOLITE.

1	Flat Swamp Mountain, Davidson County, North Carolina.	J. E. Pogue.	J. E. Pogue, A. J. S., XXVIII, p. 226, 1909.	Rhyolite.	Also in N. C. G. S. B. 22, p. 54, 1910.
2	Yogo Peak, Little Belt Mountains, Montana.	W. F. Hillebrand.	L. V. Pirsson, U. S. G. S. A. R. 20, III, p. 523, 1900.	Rhyolite porphyry.	In W. T., p. 161.
3	Anaconda Mine, Butte, Montana.	W. F. Hillebrand.	Weed and Tower, U. S. G. S. B. 228, p. 134, 1904.	Rhyolite.	Altered. Analysis "par- tial only."
4	Gallatin Valley, Gallatin County, Montana.	H. N. Stokes.	J. P. Iddings, U. S. G. S. B. 150, p. 147, 1898.	Rhyolite ash.	In W. T., p. 383.

RHYOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	Checkerboard Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 128, 1896.	Rhyolite tuff.	In W. T., p. 383.
6	Iron Pot, Lower Basin, Yellowstone National Park.	J. E. Whitfield.	W. H. Weed, U. S. G. S. B. 148, p. 132, 1897.	Rhyolite.	Altered. In W. T., p. 383.
7	De Lamar Mine, Silver City, Idaho.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 20, III, p. 179, 1900.	Rhyolite.	Altered. In W. T., p. 383.
8	De Lamar Mine, Silver City, Idaho.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 20, III, p. 179, 1900.	Rhyolite.	Altered. In W. T., p. 383.
9	De Lamar Mine, Silver City, Idaho.	H. N. Stokes.	W. Lindgren, U. S. G. S. A. R. 20, III, p. 179, 1900.	Rhyolite.	Altered.
10	Near Blue Mountain, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17, II, p. 322, 1896.	Rhyolite tuff.	Lake-bed de- posit. In W. T., p. 385.
11	Solomon Mine, Creede, Colorado.	W. C. Wheeler.	W. H. Emmons, U. S. G. S. rec. lab.	Rhyolite.	"Largely altered to chlorite."
12	Frisco District, Utah.	R. C. Wells.	B. S. Butler, U. S. G. S. rec. lab.	Lava (rhyolite?).	Altered.
13	Eightmile Hills, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 338, p. 58, 1908.	Rhyolite.	
14	Belshaw's ranch, John Day Basin, Oregon.	F. C. Calkins.	F. C. Calkins, B. Un. Cal. Dep. G., III, p. 167, 1902.	Rhyolite tuff.	
15	Laundry Farm, n. San Francisco, California.	G. E. Colby.	A. C. Lawson, U. S. G. S. Fol. 193, p. 12, 1914.	Rhyolite.	
16	Laundry Farm, n. San Francisco, California.	G. E. Colby.	A. C. Lawson, U. S. G. S. Fol. 193, p. 12, 1914.	Rhyolite.	
17	Laundry Farm, n. San Francisco, California.	C. P. Richmond.	A. C. Lawson, U. S. G. S. Fol. 193, p. 12, 1914.	Rhyolite.	
18	Hyampom, Trinity County, California.	G. Steiger.	J. S. Diller, U. S. G. S. B. 148, p. 228, 1897.	Rhyolite tuff.	In W. T., p. 385.
19	Willards Creek, Lassen County, California.	G. Steiger.	J. S. Diller, U. S. G. S. B. 148, p. 192, 1897.	Rhyolite tuff.	In W. T., p. 385.
20	Vindicator Mountain, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 183, 1909.	Rhyolite.	Altered.
21	Kinlochewe, Scotland.	W. Mackie.	W. Mackie, Tr. Edin. G. Soc., VII (4), p. 460, 1899.	Rhyolite.	Fragment in sandstone. MnO high? Not in W. T.
22	Trecastle, Conway, Wales.	A. M. Finlayson.	A. M. Finlayson, Q. J. G. S., LXVI, p. 304, 1910.	Volcanic ash.	Altered.
23	Trecastle, Conway, Wales.	A. M. Finlayson.	A. M. Finlayson, Q. J. G. S., LXVI, p. 304, 1910.	Volcanic ash.	
24	Tal-y-llyn, Ogwen, Carnarvonshire, Wales.	H. W. Greenwood.	C. B. Travis, Pr. Liv. G. Soc., X (5), p. 315, 1909.	Rhyolite.	

RHYOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
25 A3. III	76.45	8.50	3.90	0.85	1.87	0.33	0.80	2.77	0.45	0.30		0.01		CO ₂ 3.64 BaO 0.01 SrO 0.17	100.05	2.67
26 A4. IV	69.00	16.88	0.88	n. d.	0.02	1.04	4.64	3.88	3.21		0.45				100.00	
27 A4. IV	77.26	13.05	1.64	n. d.	0.24	0.72	5.41	0.65	0.55		0.15				99.67	2.637
28 A4. IV	72.68	15.62	0.95	n. d.	trace	0.63	1.17	4.30	2.90					SO ₃ 0.22 FeS ₂ 1.55	100.02	2.229
29 A3. III	69.08	17.05	1.64	0.37	0.17	0.15	2.70	5.56	1.56	0.14			trace	SO ₃ 0.32 S 1.49	100.23	
30 A3. III	72.51	14.19	2.40	none	n. d.	0.40	3.56	4.98	1.83		0.09				99.96	
31 A2. II	78.63	11.82	1.90	0.29	0.22	1.01	2.05	0.86	3.39		0.17	0.06	0.02	CO ₃ none	100.42	
32 A4. IV	70.56	12.80	1.96	n. d.	0.50	1.70	2.18	4.28	6.30		0.28		0.06		100.62	
33 A4. IV	61.28	21.94	0.48	n. d.	trace	0.61	3.37	2.58	9.64			trace			99.90	
34 A4. IV	74.29	13.40	1.52	trace	0.88	0.85	5.74	2.14	1.40		trace	trace	trace		100.22	
35 A4. IV	67.25	13.12	0.24	n. d.	1.10	1.23	0.59	4.38	6.11	6.15					100.17	
36 A1. I	74.18	11.15	0.90	1.31	0.62	1.35	1.00	5.86	1.27	0.15	0.25	0.15	0.02	CO ₂ 2.00 ZrO ₂ none SO ₃ trace Cl trace S 0.01 Cr ₂ O ₃ none V ₂ O ₅ none NiO 0.10 BaO trace SrO none Cu trace	100.32	2.654
37 B3. IV	71.33	14.77	trace	2.47	0.52	0.81	4.18	0.37	1.25	0.20		0.08	0.04		99.12	
38 A2. II	72.40	14.09	0.48	2.52	0.20	1.15	2.97	4.09	0.86		0.15		0.42	CO ₂ 0.82	100.15	
39 A2. II	69.30	13.92	0.48	2.81	0.25	2.17	1.44	3.79	2.40		0.18		0.42	CO ₂ 2.56	99.72	

RHYOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
25	Y Trefan, Nant Ffrancon, Carnarvonshire, Wales.	H. W. Greenwood.	C. B. Travis, Pr. Liv. G. Soc., X (5), p. 315, 1909.	Rhyolite.	
26	Dufton Pike, Westmoreland, England.	P. Holland.	F. Rutley, Q. J. G. S., LVII, p. 36, 1901.	Rhyolite tuff.	"H ₂ O includes CO ₂ and loss."
27	Altenshausen, near Magdeburg, Prussia.	Büdlander.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 200, 1892.	Silicified tuff.	In W. T., p. 387.
28	Nagy Mihaly, Hungary.	K. v. Muraközy.	K. v. Muraközy, F. K., XXII, p. 54, 1892.	Rhyolite.	In W. T., p. 131.
29	Verespatak, Hungary.	R. Lunzer.	G. v. Sgädeczky, F. K., XXXIX, p. 451, 1909.	Rhyolite.	Altered.
30	Birincampo, San Pietro, Sardinia.	A. Johnsen.	A. Johnsen, Anh. Abh. Pr. A.K. W., No. 2, p. 53, 1912.	Liparite tuff.	Also in N. J. Cb., 1912, p. 738.
31	Balachany, Baku District, Caucasus.	N. Orlov.	P. Tachirwinsky, Z. Vulk., I, p. 96, 1914.	Volcanic ash.	
32	Urgüb, near Mount Argæus, Asia Minor.	Schwager.	L. v. Ammon in Oberhummer and Zimmerer, Durch Syrien, p. 334, 1899.	Liparite tuff.	Cf. N. J., 1900, II, p. 61. In W. T., p. 389.
33	Mai Meteré Valley, Adi Ugri, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 113, 1909.	Liparite tuff.	
34	Kuram Tash, W. Kansu, China.	C. Pfeil.	K. Futterer, Durch Asien., III (4), p. 24, 1909.	Silicified tuff.	
35	Muaø River, Cebu, Philippine Islands.	H. S. Walker.	H. G. Ferguson, Phil. J. Sci., (A), II, p. 408, 1907.	Rhyolite.	
36	Jenolan Caves, New South Wales.	W. G. Stone.	G. W. Card, pers. com.	Rhyolite.	
37	Toooloom, New South Wales.	W. G. Stone.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Volcanic tuff.	
38	Coromandel, Hauraki, New Zealand.	J. S. Macclaurin.	Fraser and Adams, N. Z. G. S. B. 4, p. 87, 1907.	Rhyolite.	
39	Omoho Creek, Coromandel, Hauraki, New Zealand.	J. S. Macclaurin.	Fraser and Adams, N. Z. G. S. B. 4, p. 64, 1907.	Rhyolite tuff.	

QUARTZ DIORITE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 A1. I	64.75	15.45	0.64	3.85	1.47	4.27	3.71	2.48	1.06	0.10	1.11	0.10	0.06	CO ₂ 0.95 S 0.02 BaO 0.04	100.05	2.682
2 A1. I	69.87	12.02	1.42	3.49	2.30	7.86	0.66	0.11	0.89	0.18	0.69	0.17	0.16	CO ₂ 0.43 SO ₃ none Cl none S none BaO none SrO none	100.25	
3 A2. II	71.22	15.05	trace	1.54	0.33	none	0.42	6.99	1.52	0.32	0.31	0.08	0.05	CO ₂ 1.50 FeS ₂ 0.45 BaO none	99.78	2.549
4 A4. IV	66.90	15.83	?	?	trace	0.05	0.08	0.03	3.88	0.87	0.68		none	CO ₂ none Fe 4.37 S 5.46	98.15	
5 A2. II	65.14	15.63	2.37	2.13	1.85	3.62	2.63	4.29	0.75	0.37	0.59	0.16	trace	SO ₃ 0.05 Cl none BaO 0.10 SrO trace	99.68	
6 A2. II	64.81	19.44	1.82	0.16	0.19	0.18	0.21	5.30	5.25	1.41	0.73	0.10	trace	CO ₂ none SO ₃ 0.31 BaO 0.10 SrO trace	100.01	
7 A3. III	62.09	15.49	8.52	n. d.	0.42	0.20	0.37	4.34	3.01	1.20	0.51	0.13	trace	CO ₂ none SO ₃ none S 5.47 Cr ₂ O ₃ none BaO trace Cu 0.25	102.00 2.05	
8 A2. II	56.80	21.02	3.06	0.90	1.21	0.35	0.50	4.78	2.88	7.68	0.60	0.05	trace	CO ₂ none SO ₃ none S 0.17 Cr ₂ O ₃ trace BaO 0.05 Cu 0.10	99.95	
9 A2. II	54.30	13.63	1.89	2.22	2.13	7.36	0.16	4.41	2.19	4.09	0.61	0.20	0.71	CO ₂ 5.50 SO ₃ none FeS ₂ 0.49 BaO trace ZnO 0.12	100.01	
10 A1. I	66.70	13.25	1.34	0.51	0.30	0.05	0.39	4.03	0.37	0.08	0.20	0.12	trace	CO ₂ 0.21 FeS ₂ 5.09 FeAsS 4.75 PbS 0.59 ZnS 1.86 BaO none	99.84	2.979
11 A1. I	66.02	14.14	1.53	0.37	0.67	0.26	0.39	4.63	0.48	0.10	0.56	0.17	trace	CO ₂ 0.25 F 0.02 FeS ₂ 6.73 FeAsS 0.72 PbS 2.02 ZnS 0.74 BaO 0.04	99.94	2.893
12 A1. I	71.93	12.21	0.64	2.99	0.58	2.59	0.23	3.29	0.37	2.06	0.40	0.10	0.18	CO ₂ 1.95 S 0.18 NiO none BaO trace SrO trace Fe 0.13 Zn 0.09 Pb trace	99.92	
13 A2. II	66.66	14.26	0.67	2.41	0.95	3.37	none	4.19	2.16	0.36	0.49	0.17	trace	CO ₂ 3.67 SO ₃ none FeS ₂ 0.95 BaO none	100.31	2.774
14 A2. II	66.87	18.14	1.36	1.06	0.68	0.11	0.61	4.12	4.05	0.87	0.85	0.05	none	CO ₂ none SO ₃ 0.05 S 0.23 Cu 0.70	99.75	2.27
15 A2. II	62.56	17.21	2.29	3.64	1.13	0.29	0.07	6.02	2.70	0.14	0.70	0.24	0.45	CO ₂ 1.93 SO ₃ 0.02 S 0.13 Cu 0.09	99.61	2.53

QUARTZ DIORITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Montrose Station, Lynnfield, Massachusetts.	M. F. Connor.	C. H. Clapp, pers. com.	Hybrid between granite and gabbro-diorite.	
2	Near Sweden, Gordon County, Georgia.	H. N. Stokes.	A. H. Brooks, U. S. G. S. B. 168, p. 55, 1900.	Meta-quartz diorite.	Not fresh. In W. T., p. 221.
3	Clancy, Montana.	J. G. Fairchild.	A. Knopf, U. S. G. S. rec. lab.	Quartz monzonite.	Altered, Cf. No. 8, II. 4. 2. 3.
4	Leonard Mine, Butte, Montana.	W. F. Hillebrand.	W. H. Weed, U. S. G. S. P. P. 74, p. 88, 1912.	Quartz monzonite.	Altered.
5	Butte, Montana.	H. N. Stokes.	W. H. Weed, J. G., VII, p. 749, 1899.	Granite (quartz monzonite).	Weathered. Also in U. S. G. S. P. P. 74, p. 86, 1912. In W. T., p. 375.
6	Atlantic Mine, Butte, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. P. P. 74, p. 88, 1912.	Quartz monzonite.	Altered. Cf. No. 5, II. 4. 3. 3. In W. T., p. 375.
7	Parrott Mine, Butte, Montana.	E. T. Allen.	W. H. Weed, U. S. G. S. P. P. 74, p. 88, 1912.	Quartz monzonite.	Altered.
8	Colusa Mine, Butte, Montana.	E. T. Allen.	W. H. Weed, U. S. G. S. P. P. 74, p. 88, 1912.	Quartz monzonite.	Altered.
9	Original Mine, Butte, Montana.	E. T. Allen.	W. H. Weed, U. S. G. S. P. P. 74, p. 88, 1912.	Quartz monzonite.	Altered.
10	Rimini, Montana.	J. G. Fairchild.	A. Knopf, U. S. G. S. rec. lab.	Quartz monzonite.	Altered.
11	Rimini, Montana.	J. G. Fairchild.	A. Knopf, U. S. G. S. rec. lab.	Quartz monzonite.	Altered.
12	Hailey, Idaho.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 20, II, p. 219, 1900.	Quartz monzonite.	Altered. Cf. No. 90, I. 4. 2. 3. In W. T., p. 375.
13	Willow Creek District, Boise County, Idaho.	G. Steiger.	W. Lindgren, U. S. G. S. A. R. 18, III, p. 640, 1898.	Granodiorite.	Altered. In W. T., p. 375.
14	Frisco District, Utah.	R. C. Wells.	B. S. Butler, U. S. G. S. rec. lab.	Quartz monzonite.	Altered.
15	Frisco District, Utah.	R. C. Wells.	B. S. Butler, U. S. G. S. rec. lab.	Granodiorite.	Altered.

QUARTZ DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16 A1. I	61.64	14.66	1.95	1.68	2.55	4.65	2.71	3.07	2.56	1.04	0.48	0.24	0.06	CO ₂ 2.15 ZrO ₂ 0.01 SO ₃ none Cl trace F trace FeS ₂ 0.32 Cr ₂ O ₃ none BaO 0.18 SrO 0.06 Li ₂ O trace	100.01	
17 A1. I	59.68	15.61	2.49	2.38	2.52	4.63	3.96	2.96	2.00	0.51	0.62	0.29	0.08	CO ₂ 2.29 ZrO ₂ 0.01 SO ₃ none Cl none FeS ₂ 0.02 Cr ₂ O ₃ none BaO 0.15 SrO 0.07	100.27	
18 A1. I	61.99	15.81	3.28	2.69	2.24	4.62	2.73	2.51	1.99	0.91	0.94	0.11	trace	ZrO ₂ 0.03 S trace Cr ₂ O ₃ trace BaO 0.06	99.91	
19 A1. I	60.26	15.73	1.25	2.68	1.82	5.44	1.92	3.71	2.54	0.33	0.42	0.12	0.04	CO ₂ 3.99 FeS ₂ 0.08 BaO 0.07 SrO trace Li ₂ O trace	100.40	
20 A1. I	59.76	14.45	1.04	3.52	2.26	6.09	1.12	3.73	2.58	0.26	0.46	0.16	0.09	CO ₂ 4.47 FeS ₂ 0.24 BaO 0.05 SrO trace Li ₂ O trace	100.28	
21 A1. I	58.43	17.40	0.77	2.19	1.50	5.25	1.76	4.03	2.61	0.30	none	0.13	none	CO ₂ 4.04 SO ₃ none FeS ₂ 1.59 BaO none	100.00	
22 A1. I	56.25	17.65	0.76	2.64	1.69	4.46	0.30	6.01	2.36	0.30	0.25	0.21	none	CO ₂ 4.82 SO ₃ none FeS ₂ 2.87 BaO 0.03	100.60	
23 A1. I	46.13	15.82	0.89	2.27	2.13	10.68	0.17	5.30	2.42	0.12	0.67	0.10	0.09	CO ₂ 11.24 SO ₃ 0.04 FeS ₂ 1.61 NiO trace ZnO trace BaO trace SrO trace	99.68	
24 A3. III	68.99	20.29	2.10	1.62	0.40	4.75	0.15	0.09	0.14		trace	trace	none	CO ₂ 1.10 S trace	99.63	
25 A2. II	57.96	17.43	0.45	1.82	2.34	5.07	5.17	0.45	1.04		1.21	0.02	none	CO ₂ 6.32 FeS ₂ 0.33	99.61	
26 A2. II	59.32	13.33	1.36	7.32	1.79	4.37	2.58	2.30	3.34		1.04	0.18		CO ₂ 2.91 SO ₃ 0.14 Org. 0.02	100.00	2.736
27 A2. II	55.54	15.64	1.19	7.13	4.84	5.67	3.17	2.28	2.93		1.24	0.45		CO ₂ 0.40 SO ₃ 0.33 Org. 0.06	100.87	2.798
28 A3. III	63.66	7.81	8.13	3.61	1.85	2.56	3.02	2.45	2.94			0.31	0.54	CO ₂ 3.04	99.92	
29 A3. III	66.05	15.86	2.52	0.91	0.51	4.35	4.30	3.05	1.48	0.79	trace		trace		99.82	
30 A3. III	60.14	14.62	6.10	4.67	0.24	6.25	3.34	3.26	1.54	0.37	0.33				100.86	
31 A2. II	58.77	18.04	2.19	4.98	2.64	6.05	1.26	2.42	3.89		0.05		trace		100.29	2.78
32 A2. II	68.26	14.44	2.07	2.62	0.75	2.71	3.62	3.49	1.16	0.10	0.71			CO ₂ 0.28	100.09	

QUARTZ DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	Valeo Mine, Park City quadrangle, Utah.	W. F. Hillebrand.	J. M. Boutwell, U. S. G. S. P. P. 77, p. 84, 1912.	Quartz diorite porphyry.	
17	Daly West Mine, Park City quadrangle, Utah.	W. F. Hillebrand.	J. M. Boutwell, U. S. G. S. P. P. 77, p. 84, 1912.	Quartz diorite porphyry.	
18	Pinal Mountains, Globe District, Arizona.	W. F. Hillebrand.	F. L. Ransome, U. S. G. S. P. P. 12, p. 60, 1903.	Quartz-mica diorite.	
19	Providence Mine, Nevada County, California.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 149, 1896.	Granodiorite.	Altered wall rock. Cf. No. 44, I.4.3.4. In W. T., p. 407.
20	Providence Mine, Nevada County, California.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 149, 1896.	Granodiorite.	Altered wall rock. In W. T., p. 407.
21	Empire Mine, Nevada County, California.	G. Steiger.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 149, 1896.	Granodiorite.	Altered wall rock. In W. T., p. 407.
22	Bellefontain Tunnel, Nevada County, California.	G. Steiger.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 149, 1896.	Granodiorite.	Altered wall rock. In W. T., p. 407.
23	Ophir, Placer County, California.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 14, II, p. 275, 1894.	Granodiorite.	Altered wall rock. Cf. No. 88, II.4.3.4. In W. T., p. 407.
24	Smiths Post Island, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. River, p. 45, 1900.	Quartz diorite.	In W. T., p. 407.
25	Omai, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. River, p. 45, 1900.	Quartz diorite.	In W. T., p. 407.
26	Bielstein, near Rübeland, Harz Mountains.	Gremse.	K. A. Lossen, Jb. Pr. G. L.-A. (1889), p. 290, 1892.	Quartz diorite porphyry.	In W. T., p. 243.
27	Lampersdorf, Silesia.	W. Hampe.	E. Dathe, Jb. Pr. G. L.-A. (1886), p. 331, 1887.	Quartz diorite.	In W. T., p. 283.
28	Roztok, Moldautal, Bohemia.	Strnad.	J. Kevana, Ref. N. J., 1898, I, p. 485.	Quartz diorite.	In W. T., p. 219.
29	Ochsensprung, near Maul, Tyrol.	G. Hradil.	G. Hradil, Sb. Ak. W. Wien, CXXI, p. 879, 1912.	Tonalite porphyry.	
30	Reinthal, near Maul, Tyr	G. Hradil.	G. Hradil, Sb. Ak. W. Wien, CXXI, p. 880, 1912.	Tonalite.	
31	Töll, near Meran, Tyrol.	E. Zdarek.	F. Becke, Ds. Ak. W. Wien, LXXV (1), p. 160, 1913.	Töllite (tonalite porphyry).	
32	Riasonov Trail, Jenissei District, Siberia.	G. Zhukovsky.	A. Meister, Reg. Aurif. Sib., IX, p. 239, 1910.	Chlorite adamellite.	

QUARTZ DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
33 A3. III	63.38	17.36	1.61	1.98	1.80	4.18	4.07	0.31	0.54					CO ₂ 1.13 FeS ₂ 3.38	99.74	
34 A3. III	62.43	17.88	1.78	3.53	4.50	3.43	3.10	2.75	1.37		trace	trace			100.77	2.74
35 A2. II	57.69	15.65	7.42	2.41	3.10	6.92	2.33	2.37	1.59		0.03	0.22	trace		99.73	2.779

DACITE.

1 A2. II	67.27	14.84	1.01	0.85	1.36	2.30	2.94	2.87	4.95	1.55	0.27	0.06	trace	CO ₂ none ZrO ₂ none SO ₃ none Cr ₂ O ₃ trace BaO 0.15 SrO none	100.38	
2 A3. III	65.78	14.87	1.27	1.00	1.89	2.41	2.58	2.71	4.32	2.87		0.08	trace		99.78	
3 A2. II	63.55	17.10	3.21	0.92	0.43	0.82	2.12	2.30	5.13	4.20	0.41	0.10	0.03	CO ₂ none S trace	100.32	
4 A1. I	60.23	18.64	3.81	0.88	1.64	6.04	3.87	1.46	1.97	0.95	0.57	0.20	trace	CO ₂ none ZrO ₂ 0.01 Cr ₂ O ₃ trace BaO 0.11 SrO 0.05	100.43	
5 A4. IV	68.19	15.13	1.31	0.42	0.29	1.19	3.13	6.56	n. d.		0.32	0.15			96.69	
6 A1. I	60.53	15.32	0.20	0.14	0.06	0.41	0.84	1.06	6.60	1.33	0.80	0.27	trace	CO ₂ none ZrO ₂ 0.01 SO ₃ 5.97 F trace FeS ₂ 7.20 BaO 0.06	100.80	
7 A3. III	55.34	16.25	5.59	2.83	5.51	3.93	4.81	1.51	3.06			0.36		CO ₂ 1.51	100.70	2.674
8 A3. III	70.03	10.65	1.16	0.72	0.70	3.55	1.75	1.62	5.79	2.48	0.53	trace		CO ₂ 0.94	99.92	
9 A3. III	67.27	16.31	3.13	1.15	0.84	3.48	3.61	2.91	1.16		0.40	trace	trace		100.26	
10 A3. III	68.81	14.61	1.36	1.26	0.74	2.21	3.31	4.61	2.60	0.32	0.36	trace			100.19	
11 A3. III	62.23	16.96	1.27	2.92	2.02	6.56	3.07	1.07	2.47	0.81	0.63	trace		CO ₂ 0.10	100.11	
12 A3. III	67.25	16.38	4.62	1.30	1.76	3.05	2.56	1.36	0.30				0.33	CO ₂ 1.56	100.47	
13 A2. II	64.48	15.07	0.60	5.19	2.17	3.31	2.55	3.04	2.01	0.13	0.90	0.22	0.11	CO ₂ trace SO ₃ none Cl trace NiO 0.01	99.79	2.708
14 A2. II	76.61	8.31	1.08	0.59	0.51	3.61	0.29	1.98	1.08	0.43	0.28	0.11	0.11	CO ₂ 1.87 FeS ₂ 3.59	100.45	
15 A2. II	69.35	11.66	1.53	1.66	0.46	2.09	1.06	3.31	2.12	1.61	0.43	0.26	0.11	CO ₂ 2.24 FeS ₂ 1.88	99.77	

QUARTZ DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
33	Dandenong, Victoria.	H. C. Jenkins.	J. W. Gregory, Pr. R. Soc. Vict., XIV, p. 201, 1902.	Granodiorite.	
34	Ensay, Omeo, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XXII, p. 99, 1886.	Quartz-mica diorite.	In W. T., p. 231.
35	Tambo River, Noyang, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XX, p. 31, 1884.	Quartz-mica diorite.	In W. T., p. 231.

DACITE.

1	Near Paskenta, Tehama County, California.	E. T. Allen.	J. S. Diller, A. J. S., XV, p. 360, 1903.	Dacite tuff.	
2	Near Paskenta, Tehama County, California.	G. Steiger.	J. S. Diller, A. J. S., XV, p. 360, 1903.	Dacite tuff.	In W. T., p. 417.
3	Hay Fork Valley, Trinity County, California.	R. C. Wells.	J. S. Diller, U. S. G. S. rec. lab.	Tuff (dacite?).	
4	Redding Creek, Trinity County, California.	E. T. Allen.	J. S. Diller, A. J. S., XV, p. 360, 1903.	Tuff.	
5	Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 148, 1905.	Rhyolite-dacite.	Altered. Low sum due to H ₂ O?
6	Combination Mine, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, Ec. G., II, p. 680, 1907.	Dacite.	Altered. Also in U. S. G. S. P. P. 66, p. 181, 1909.
7	Ruminhui Volcano, near Cotopaxi, Ecuador.	A. Young.	A. Young, Hochg. Ecuad., II (2), p. 228, 1902.	Dacite.	Altered.
8	Epicauros, Argolis, Greece.	M. Dittrich.	Milch and Renz, N. J. B. B., XXXI, p. 532, 1911.	Tuff (dacite?).	
9	Kalymnos Island, Aegean Sea.	F. Millosevitch.	F. Millosevitch, Rend. Ac. Linc., XXI (2), p. 309, 1912.	Dacite tuff.	
10	Lau Pangaion, Karoland, Sumatra.	M. Dittrich.	H. Stegmann, N. J. B. B., XXVII, p. 438, 1909.	Quartz trachyte- andesite tuff.	
11	Palpalang, Karoland, Sumatra.	M. Dittrich.	H. Stegmann, N. J. B. B., XXVII, p. 427, 1909.	Dacite.	Altered.
12	Dandenong, Victoria.	H. C. Jenkins.	J. W. Gregory, Pr. R. Soc. Vict., XIV, p. 201, 1902.	Dacite.	
13	Near Heskett, Macedon, Victoria.	A. G. Hall.	Skeats and Summers, G. S. Vict. B. 24, p. 40, 1912.	Dacite.	Propylitized.
14	Waihi Mine, Hauraki, New Zealand.	A. M. Finlayson.	Bell and Fraser, N. Z. G. S. B. 15, p. 55, 1912.	Dacite.	Altered.
15	Waihi Mine, Hauraki, New Zealand.	A. M. Finlayson.	Bell and Fraser, N. Z. G. S. B. 15, p. 55, 1912.	Dacite.	Altered.

DACITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16 B2. III	63.45	15.26	2.28	3.01	1.29	3.14	2.21	1.78	2.90	1.10	0.75	0.29	0.36	CO ₂ 1.08	99.20	
17 A2. II	61.78	14.89	2.08	2.51	1.08	3.16	2.18	3.68	3.05	1.89	0.69	0.30	0.28	CO ₂ 2.01 FeS ₂ 0.65	100.23	
18 A2. II	59.95	17.34	0.79	4.35	2.65	4.05	2.21	2.63	2.88		0.79		0.47	CO ₂ 2.20	100.31	
19 A2. II	58.45	16.50	0.24	4.42	5.45	3.76	0.96	2.16	4.32		0.78			CO ₂ 2.83	100.30	
20 B2. III	58.39	16.51	2.46	2.98	1.66	4.08	2.08	2.89	2.87	2.41	0.68	0.31	0.32	CO ₂ 1.56	99.20	
21 A2. II	58.02	17.04	none	5.04	4.29	4.24	1.36	3.48	3.82		0.93		0.42	CO ₂ 1.14	99.78	
22 A2. II	57.20	16.39	3.01	3.13	3.31	4.44	1.58	3.60	3.16		0.60		0.22	CO ₂ 3.60	100.24	
23 A2. II	56.80	16.19	0.95	4.42	7.56	3.70	1.13	3.81	4.18		0.82		0.55	CO ₂ 0.05	100.16	
24 A2. II	66.31	16.22	1.14	2.34	0.85	3.84	3.95	2.27	2.32	0.14	0.54	0.21	0.05		100.18	
25 A2. II	62.85	15.17	4.78	1.59	1.83	5.35	2.56	2.42	2.32	0.30	0.55	0.32	0.07		100.11	

SYENITE.

1 B2. III	57.75	17.50	2.92	2.94	1.70	3.86	5.08	3.51	0.37		1.53	1.05	0.19	CO ₂ 0.55 FeS ₂ 0.21 BaO 0.07	99.23	
2 A2. II	50.56	18.28	3.57	4.62	3.38	7.10	4.30	3.31	1.40		2.25		0.13	CO ₂ 0.76	99.66	
3 A1. I	40.72	2.78	6.58	4.24	26.25	8.66	0.42	0.27	5.51	0.26	0.07	0.28	0.14	CO ₂ 3.20 Cl 0.06 S 0.70 Cr ₂ O ₃ 0.28 SrO 0.03	100.45	
4 A3. III	58.25	18.22	1.07	5.96	trace	1.51	4.19	5.59	0.85		trace		0.10	CO ₂ 4.75	100.49	
5 A3. III	58.32	15.77	6.56	0.89	0.09	11.68	0.32	4.01	1.73			0.48	0.13	ZrO ₂ traces	99.98	
6 A1. I	51.94	15.78	4.07	3.17	3.48	6.04	3.44	7.69	2.17		0.39	0.59	trace	SO ₂ 0.29 Cl 0.06 BaO 0.42 SrO 0.28	99.83	
7 A1. I	50.11	17.13	3.73	3.28	2.47	5.09	3.72	7.47	4.47		0.82	0.67	trace	SO ₂ 0.08 Cl 0.07 BaO 0.63 SrO 0.35	100.09	
8 A3. III	50.00	19.36	3.87	2.67	2.18	4.96	3.63	8.52	3.53	0.46					99.18	

DACITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	Waihi Mine, Hauraki, New Zealand.	A. M. Finlayson.	A. M. Finlayson, Ec. G., IV, p. 638, 1909.	Dacite.	"Fresh."
17	Waihi Mine, Hauraki, New Zealand.	A. M. Finlayson.	Bell and Fraser, N. Z. G. S. B. 15, p. 55, 1912.	Dacite.	Altered.
18	Waihi Mine, Hauraki, New Zealand.	Survey laboratory.	Bell and Fraser, N. Z. G. S. B. 15, p. 42, 1912.	Dacite.	Altered.
19	Waihi Mine, Hauraki, New Zealand.	Survey laboratory.	Bell and Fraser, N. Z. G. S. B. 15, p. 42, 1912.	Dacite.	Altered.
20	Waihi Mine, Hauraki, New Zealand.	A. M. Finlayson.	Bell and Fraser, N. Z. G. S. B. 15, p. 55, 1912.	Dacite.	Altered. Also in Ec. G., IV, p. 638, 1909.
21	Waihi Mine, Hauraki, New Zealand.	Survey laboratory.	Bell and Fraser, N. Z. G. S. B. 15, p. 42, 1912.	Dacite.	Altered.
22	Waihi Mine, Hauraki, New Zealand.	Survey laboratory.	Bell and Fraser, N. Z. G. S. B. 15, p. 42, 1912.	Dacite.	Altered.
23	Waihi Mine, Hauraki, New Zealand.	Survey laboratory.	Bell and Fraser, N. Z. G. S. B. 15, p. 42, 1912.	Dacite.	Altered.
24	Te Arika Falls, Aroha, Hauraki, New Zealand.	Survey laboratory.	Henderson and Bartrum, N. Z. G. S. B. 16, p. 67, 1913.	Dacite tuff.	
25	Waita Wheta River, Aroha, Hauraki, New Zealand.	Survey laboratory.	Henderson and Bartrum, N. Z. G. S. B. 16, p. 67, 1913.	Dacite tuff.	

SYENITE.

1	Mount Yamaska, Quebec.	G. A. Young.	G. A. Young, Can. G. S. A. R. XVI, p. 21, H, 1906.	Akerite.	
2	St. Bruno Mountain, Quebec.	M. F. Connor.	J. A. Dresser, Can. G. S. Mem. 7, p. 18, 1910.	Umptekite.	
3	Rocky Islet Bay, Rainy Lake, Ontario.	M. F. Connor.	A. W. Lawson, Can. G. S. Mem. 40, p. 91, 1913.	Basic facies of syenite.	
4	Livermore Falls, Campton, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XVII, p. 150, 1879.	Syenite.	Not in W. T.
5	Milams Gap, Virginia.	W. C. Phalen.	W. C. Phalen, Smiths. Misc. Coll., XLV, p. 313, 1904.	Unakite.	Metamorphosed akerite.
6	Shonkin Creek, Highwood Mountains, Montana.	W. M. Bradley.	L. V. Pirsson, U. S. G. S. B. 237, p. 139, 1905.	Syenite porphyry.	In W. T., p. 295.
7	Palisade Butte, Highwood Mountains, Montana.	H. W. Foote.	L. V. Pirsson, U. S. G. S. B. 237, p. 92, 1905.	Syenite.	In W. T., p. 297.
8	Shonkin Sag, Highwood Mountains, Montana.	W. F. Hillebrand.	Weed and Pirsson, A. J. S., XII, p. 14, 1901.	Syenite.	Also in U. S. G. S. B. 237, p. 92, 1905.

SYENITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9 A3. III	59.78	16.86	3.08	3.72	0.69	2.96	5.39	5.01	1.58				0.14	CO ₂ 0.75	99.96	
10 A1. I	63.01	18.48	0.06	0.32	0.06	2.66	10.01	0.39	0.27	0.05	0.13	0.06	0.06	CO ₂ 2.01 FeS ₂ 2.10 NiO none BaO 0.02 SrO trace	99.69	
11 A1. I	63.41	16.86	none	2.88	trace	1.47	7.38	3.09	0.42	0.29	0.26	0.12	0.28	CO ₂ 2.93 ZrO ₂ 0.04 SO ₃ none Cl none S 0.05 BaO none	99.48	
12 A2. II	60.50	16.86	1.67	2.54	1.11	2.95	6.46	5.42	1.40		0.75	0.20	0.21	CO ₂ 0.70	100.77	
13 A4. IV	58.80	16.84	2.04		2.75	0.70	5.41	4.14	2.79					CaCO ₃ 3.75 FeS ₂ 3.13	100.35	
14 A3. III	47.05	18.52	5.91	3.11	4.24	4.71	3.58	1.83	2.70					CaCO ₃ 6.63 FeS ₂ 1.95	100.23	
15 A3. III	43.33	17.88	6.80	4.46	4.99	2.18	3.53	1.02	3.36					CaCO ₃ 10.34 FeS ₂ 3.00	100.69	
16 A2. II	57.00	18.03	1.33	3.52	1.53	3.55	7.53	3.89	1.30		0.55	0.41	0.49	CO ₂ 1.05	100.18	
17 A2. II	48.46	16.81	1.46	9.14	4.44	6.14	6.31	2.33	0.59		3.05	0.67	trace	CO ₂ 1.28	100.68	
18 A2. II	69.00	14.54	0.86	0.49	0.40	2.12	4.42	5.83	0.50		0.47	0.01	0.03	CO ₂ 1.40 S trace	100.07	
19 A2. II	57.29	15.71	4.54	3.18	4.30	5.40	4.04	1.93	2.69		0.68		0.29		100.05	
20 A2. II	43.03	13.27	8.10	5.23	7.39	3.47	4.65	4.54	6.03		3.84	0.64	0.11	CO ₂ trace SO ₃ trace Cl trace	100.30	2.727
21 B2. III	40.19	16.03	6.77	4.11	4.27	5.77	6.12	4.01	5.26		3.21	2.32		SO ₃ 0.34 Cl trace BaO none SrO 0.21	99.24	2.745
22 A4. IV	57.63	16.47	5.37	n. d.	4.44	5.25	5.15	3.12	0.45					CO ₂ 2.14 S 0.95	100.97	
23 A2. II	46.96	15.97	1.92	7.35	8.97	2.72	1.65	5.55	5.58		1.35	0.26		CO ₂ 2.14	100.69	2.664
24 A3. III	58.46	14.38	3.75	6.67	1.59	5.24	1.33	3.40	2.03				0.36	CO ₂ 3.40	100.61 (100.45)	
25 A2. II	45.70	15.40	2.75	5.67	7.55	9.02	3.12	3.22	3.90		3.46	0.26	0.26		100.31 (100.05)	
26 A2. II	58.90	16.48	2.98	3.35	0.78	2.78	4.09	6.05	0.34	0.82	1.47	trace	0.08	CO ₂ 1.50 NiO 0.05 BaO none SrO none	99.67	

SYENITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, Pr. Colo. Sc. Soc., II, p. 240, 1887.	Syenite.	Also in U. S. G. S. A. R. 17 (II), p. 281, 1896. In W. T., p. 257.
10	Treadwell Mine, Douglas Island, Alaska.	W. F. Hillebrand.	G. F. Becker, U. S. G. S. A. R. 18, III, p. 39, 1888.	Soda syenite.	In W. T., p. 199.
11	Karta Bay, Kasaan Peninsula, Alaska.	R. C. Wells.	C. W. Wright, U. S. G. S. P. P. 87, p. 79, 1915.	Calcite syenite porphyry.	Calcite primary?
12	Ostø, Christiania Fjord, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 190, 1899.	Hedrumite.	In W. T., p. 253.
13	Vakkerø, Christiania Fjord, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 64, 1890.	Mica syenite porphyry.	Center of dike. In W. T., p. 389.
14	Vakkerø, Christiania Fjord, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 64, 1890.	Mica syenite porphyry.	1 foot from border of dike. In W. T., p. 389.
15	Vakkerø, Christiania Fjord, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 64, 1890.	Mica syenite porphyry.	Border of dike. In W. T., p. 389.
16	Brathagen, Lougendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 116, 1899.	Heumite.	Border of dike. In W. T., p. 253.
17	Brathagen, Lougendal, Norway.	O. N. Heidenreich.	W. C. Brögger, Eg. Kg., III, p. 106, 1899.	Heumite.	Center of dike. In W. T., p. 299.
18	Kürunavaara, Lapland, Sweden.	K. Schröder.	P. Geijer, G. Kir. Dist., p. 49, 1910.	Syenite porphyry.	
19	Svanken, near Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afh. Sv. G. Und., No. 181, p. 63, 1899.	Syenite porphyry.	In W. T., p. 241.
20	Michelsberg, Katzenbuckel, Odenwald.	W. Freudenberg.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 284, 1907.	Schliere in shonkinite.	
21	Michelsberg, Katzenbuckel, Odenwald.	W. Freudenberg.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 293, 1907.	Shonkinite porphyry.	
22	Triebischbach, Rothschönberg, Saxony.	Fritsch and Venator.	J. M. C. Henderson, Z. D. G. G., XLVII, p. 543, 1895.	Mica syenite.	In W. T., p. 391.
23	Pfeffelbach, St. Wendel, Harz Mountains.	Hesse.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 316, 1892.	Syenite porphyry.	In W. T., p. 393.
24	Dolanky, Moldautal, Bohemia.	Plamina.	J. Klvana, Ref. N. J., I, p. 485, 1898.	Quartz syenite.	In W. T., p. 227.
25	Noil Nimassi, Timor Island.	Pisani.	H. A. Brouwer, N. J. Cb., p. 575, 1913.	Shonkinite.	
26	Oakey Creek, Nandewar Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 903, 1908.	Pulaskite porphyry.	

SYENITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
27 A1. I	55.86	15.25	4.92	6.07	0.20	2.13	2.34	9.28	0.50	0.70	0.65	0.16	0.42	CO ₂ 1.80 SO ₃ trace Cl trace F 0.05 S 0.09 Cr ₂ O ₃ none V ₂ O ₅ none BaO trace SrO none	100.42	2.706
28 A1. I	55.16	16.67	2.36	7.31	0.56	2.30	5.65	6.97	0.88	0.85	0.60	0.38	0.47	CO ₂ 1.50 SO ₃ 0.25 Cl trace F 0.15 S 0.02 Cr ₂ O ₃ none V ₂ O ₅ none BaO trace SrO none	100.08	2.675

PORPHYRY.

1 A3. III	60.71	14.87	3.26	3.60	3.52	3.29	4.40	2.52	2.35					CO ₂ 1.68	100.20	
2 A3. III	56.25	18.42	1.56	2.41	2.38	6.13	8.10	0.32	0.22					CO ₂ 4.58 S 0.10	100.47	
3 A3. III	59.42	17.86	3.46	1.59	1.15	2.61	9.60	0.60	0.43					CO ₂ 2.01 S 1.66	100.39	
4 A3. III	70.74	14.68	0.69	0.58	0.28	4.12	2.29	2.59	2.09				0.06	CO ₂ 2.14 Cl trace BaO 0.03 SrO trace	100.29	2.680
5 A2. II	68.10	14.97	2.78	1.10	1.10	3.04	3.46	2.93	1.28		0.07	0.16	0.09	CO ₂ 0.92 Cl 0.03 SrO 0.08	100.11	2.736
6 A2. II	66.45	15.84	2.59	1.43	1.21	2.90	3.92	2.89	0.84		0.10	0.36	0.09	CO ₂ 1.35 Cl 0.05 SrO 0.07	100.09	2.670
7 A1. I	66.37	11.15	none	0.32	trace	0.18	0.56	9.03	0.44	0.14	0.23	none		CO ₂ none ZrO ₂ 0.02 SO ₃ 0.35 FeS ₂ 10.75 BaO 0.10	99.64	2.652
8 A1. I	66.27	15.01	1.84	0.39	0.71	0.18	0.72	9.62	1.50	0.34	0.47	0.16	none	CO ₂ none ZrO ₂ none SO ₃ none Cl none F 0.15 S 1.66 BaO 0.17 SrO trace CuO 1.62	100.81	2.43
9 A1. I	63.09	16.33	1.37	3.29	3.53	0.70	2.79	3.91	2.35	0.95	0.43	0.42	none	CO ₂ none ZrO ₂ none SO ₃ none Cl none F 0.08 S 0.67 BaO 0.09 SrO trace CuO 0.55	100.55	
10 A2. II	58.64	15.35	3.25	2.54	3.84	5.37	3.60	4.23	1.50	0.86	0.83	0.02	trace	CO ₂ none S 0.05 Cr ₂ O ₃ trace BaO 0.18	100.26	
11 A2. II	56.78	16.90	6.87	2.34	0.03	1.18	0.37	7.02	2.23	1.32	0.81	0.04	trace	CO ₂ 0.26 S 5.93 Cr ₂ O ₃ trace BaO 0.14	102.22 2.22	
12 A2. II	56.17	15.94	3.43	1.92	1.60	5.19	2.48	4.91	2.95	1.30	0.90	0.20	trace	CO ₂ 2.01 S 1.03 BaO 0.13	100.21	

SYENITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
27	Mittagong, New South Wales.	D. Mawson.	Taylor and Mawson, Pr. R. Soc. N. S. W., XXXVII, p. 341, 1903.	Syenite.	Melanocratic.
28	Mittagong, New South Wales.	D. Mawson.	Taylor and Mawson, Pr. R. Soc. N. S. W., XXXVII, p. 341, 1903.	Syenite.	Leucocratic.

PORPHYRY.

1	Swastika Area, Ontario.	E. L. Bruce.	E. L. Bruce, Rep. Bur. Min. Ont., XXI (1), p. 259, 1912.	Feldspar porphyry.	
2	Swastika Area, Ontario.	E. L. Bruce.	E. L. Bruce, Rep. Bur. Min. Ont., XXI (1), p. 262, 1912.	Porphyry.	
3	Nighthawk Lake; Porcupine Area, Ontario.	Not stated.	A. G. Burrows, Rep. Bur. Min. Ont., XXI (1), p. 218, 1912.	Felsite.	
4	Iron Hill, Alma District, Colorado.	W. F. Hillebrand.	H. B. Patton, Colo. G. S. B. 3, p. 81, 1912.	Porphyry.	
5	Johnson Gulch, Leadville, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. Mon. 12, p. 332, 1886.	Porphyry.	In W. T., p. 187.
6	Mount Lincoln, Leadville, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. Mon. 12, p. 332, 1886.	Porphyry.	In W. T., p. 175.
7	Leadville, Colorado.	R. C. Wells.	J. D. Irving, U. S. G. S. rec. lab.	Pyritic porphyry.	
8	Bingham District, Utah.	G. Steiger.	B. S. Butler, U. S. G. S. rec. lab.	Porphyry.	Altered.
9	Bingham District, Utah.	G. Steiger.	B. S. Butler, U. S. G. S. rec. lab.	Porphyry.	Altered.
10	Last Chance Mine, Bingham, Utah.	E. T. Allen.	J. M. Boutwell, U. S. G. S. P. P. 38, p. 178, 1905.	Porphyry.	Altered from No. 23, II.5.2.3.
11	Last Chance Mine, Bingham, Utah.	E. T. Allen.	J. M. Boutwell, U. S. G. S. P. P. 38, p. 178, 1905.	Porphyry.	Altered from No. 23, II.5.2.3.
12	Last Chance Mine, Bingham, Utah.	E. T. Allen.	J. M. Boutwell, U. S. G. S. P. P. 38, p. 178, 1905.	Porphyry.	Altered from No. 23, II.5.2.3.

PORPHYRY—Continued

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13 A3. III	63.85	17.51	1.94	0.55	—	5.67	0.25	4.77	1.02					CO ₂ 3.70 S 0.29 CuO 0.33	99.88	
14 A4. IV	82.10	11.30	0.79	n. d.	1.04	—	0.21	2.34	2.00						99.79	
15 A4. IV	75.11	13.50	0.85	n. d.	1.02	0.64	0.38	5.75	2.37						99.62 (99.61)	
16 A4. IV	70.50	17.85	1.22	n. d.	1.05	0.02	3.05	4.12	3.10						100.91	
17 A3. III	59.90	18.10	1.45	3.42	5.65	2.69	2.02	4.05	3.51						100.79	
18 A2. II	70.68	11.45	1.31	0.72	2.28	0.65	4.85	0.23	1.41				0.05	CO ₂ 5.08 FeS ₂ 1.27	100.15	
19 A3. III	56.44	16.17	7.72	3.00	2.02	10.13	1.17	1.18	2.37				0.30		100.50	
20 A4. IV	50.38	36.08	1.36	n. d.	0.66	0.15	1.32	5.17	4.40					S trace	99.52	2.718
21 A4. IV	54.24	15.93	10.84	n. d.	2.94	3.39	3.91	3.93	4.62		1.06	trace	trace		100.86	2.695
22 A3. III	52.85	19.13	8.79	0.19	2.83	4.96	4.35	2.89	1.74		trace		trace	CO ₂ 2.13	99.86	2.66
23 A3. III	52.18	19.13	7.42	0.21	1.41	5.66	3.79	4.13	3.58		trace		0.39	CO ₂ 2.11	100.01	2.67
24 A2. II	50.78	18.70	7.28	1.23	5.33	1.57	1.83	7.36	4.20		1.32	0.22		CO ₂ 0.23	100.11	
25 A2. II	49.68	19.11	8.45	0.50	3.73	0.33	0.79	8.45	7.30		1.42	0.21		CO ₂ 0.05 SO ₃ 0.17	100.19	
26 A2. II	47.04	16.41	2.30	9.42	10.72	2.20	1.34	4.46	2.42		2.81	0.23	trace	SO ₃ 0.30	99.65	2.879
27 A2. II	43.83	15.54	2.73	7.45	9.12	11.56	1.45	2.79	1.88		2.90	0.62		SO ₃ 0.19	100.06	2.996
28 A2. II	43.51	21.57	1.88	3.04	2.83	13.68	trace	6.05	3.73		3.42	0.14		SO ₃ 0.24	100.09	2.875
29 A2. II	41.98	15.11	3.29	9.77	6.88	8.04	1.16	4.65	4.22		2.28	0.49		CO ₂ 1.60 SO ₃ 0.34	99.81	2.850
30 A2. II	40.60	17.95	7.09	8.16	7.12	6.00	1.94	4.85	2.43		3.02	0.14		CO ₂ none SO ₃ 0.17	99.80	2.918
31 A2. II	44.17	13.49	1.69	7.75	4.88	8.23	1.36	5.92	3.43		2.66	0.65		CO ₂ 6.03	100.69	2.743
32 A2. II	61.22	15.40	6.06	0.63	1.96	0.62	3.54	6.48	3.02		0.60	0.41		SO ₃ 0.10	100.04	2.718

PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	Tamaya, Chile.	C. Schwarz.	v. Groddeck, Z. D. G. G., XXXIX, p. 250, 1887.	Porphyry.	In W. T., p. 391.
14	La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Porphyry tuff.	
15	Guéret, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Porphyry.	
16	La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Orthophyre tuff.	
17	Samondeix, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Andesitic orthophyre.	
18	San Dionisio, Huelva, Spain.	A. M. Finlayson.	A. M. Finlayson, Ec. G., V, p. 407, 1910.	Porphyry.	Altered from No. 27, I.3.2.3.
19	Koijärvi, Urkala, Finland.	A. W. Forsberg.	J. J. Sederholm, Fin. G. Und., Bl. 18, p. 49, 1890.	Uralite porphyry.	Also in T. M. P. M., XII, p. 120, 1891. In W. T., p. 247.
20	Oberhunden, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 573, 1893.	Porphyry tuff.	Altered. In W. T., p. 393.
21	Reisigenstein, Thuringia.	A. Mühlenberg.	A. Mühlenberg, In. Diss. Halle, p. 51, 1908.	Orthophyre.	
22	Abtsberg, Friedrichroda, Thuringia.	A. Mühlenberg.	A. Mühlenberg, In. Diss. Halle, p. 28, 1908.	Orthophyre.	Pebble in conglomerate.
23	Gottlob, Friedrichroda, Thuringia.	A. Mühlenberg.	A. Mühlenberg, In. Diss. Halle, p. 28, 1908.	Orthophyre.	Pebble in conglomerate.
24	Gerschberg, Prussia.	Boettcher.	H. Grebe, Erl. G. Kt. Pr., Bl. Wählen, p. 33, 1889.	Orthophyre.	In W. T., p. 393.
25	Audeborn, Prussia.	Boettcher.	H. Grebe, Erl. G. Kt. Pr., Bl. Wählen, p. 33, 1889.	Orthophyre.	In W. T., p. 393.
26	Schmalenberg, Harzburg, Harz.	Wölbling.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXV, p. 61, 1907.	Orthophyre tuff.	Rich in biotite.
27	Schmalenberg, Harzburg, Harz.	Wölbling.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXV, p. 61, 1907.	Orthophyre tuff.	Rich in augite.
28	Wilhelmsblick, Harzburg, Harz.	Eyme.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXV, p. 61, 1907.	Orthophyre tuff.	Rich in garnet.
29	Schmalenberg, Harzburg, Harz.	Eyme.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXV, p. 42, 1907.	Orthophyre.	Metamorphosed.
30	Schniggenloch, Harzburg, Harz.	Winter.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXV, p. 61, 1907.	Orthophyre tuff.	Rich in biotite.
31	Neuwerk, Harz.	Steffen.	K. A. Lossen, Jb. Pr. G. L.-A., VI, p. 213, 1886.	Orthophyre mandelstein.	In W. T., p. 393.
32	Berthelsdorf, Sudetische Mulde, Bohemia.	Eyme.	G. Berg, Jb. Pr. G. L.-A., XXVIII, p. 239, 1910.	Orthoclase porphyry.	

PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
33 A2. II	67.36	14.14	3.61	0.48	0.74	3.10	3.79	3.56	0.98	1.06	0.66	0.61	0.19	CO ₂ trace F 0.19	100.47	
34 A4. IV	59.82	17.89	4.43	n. d.	1.74	3.81	4.27	6.21	2.01				trace		100.18	
35 A2. II	56.22	13.15	3.49	0.69	1.52	7.93	0.45	8.45	1.42	1.19	0.47	0.39	trace	CO ₂ 4.30 F none	99.67	2.484
36 A3. III	60.75	18.45	1.75	3.42	1.66	6.95	3.13	1.65	1.82			0.17		CO ₂ 0.92	101.02	
37 A2. II	56.79	18.28	3.78	2.32	1.15	6.26	3.14	5.09	1.20		0.68	0.91	trace	CO ₂ 0.61	100.21	
38 A3. III	64.88	16.43	3.69	0.54	0.19	2.22	3.73	6.57	1.17					CO ₂ 0.49	99.91	
39 A3. III	61.52	19.96	1.78	3.16	2.72	3.36	2.28	3.24	1.86					CO ₂ 0.56	100.44	
40 A4. IV	59.52	13.02	11.08	n. d.	4.60	1.90	3.02	3.86	2.16					CO ₂ 1.16	100.32	
41 A2. II	69.99	14.92	1.09	1.44	0.45	0.57	4.05	4.83	1.02			0.07	0.10	CaCO ₃ 1.41 MgCO ₃ 0.23	100.17	
42 A1. I	62.85	13.58	1.95	5.45	1.92	4.10	3.32	0.88	2.50	0.20	0.90	0.18	0.14	CO ₂ 1.85 ZrO ₂ none SO ₃ trace Cl trace Cr ₂ O ₃ none V ₂ O ₅ trace NiO trace BaO none SrO 0.10 Cu trace	99.82	2.753
43 A1. I	60.95	15.04	2.60	3.69	2.82	4.30	3.22	3.00	2.08	0.17	0.65	0.26	0.08	CO ₂ 0.80 ZrO ₂ none SO ₃ 0.02 Cl trace V ₂ O ₅ 0.02 NiO trace BaO 0.13 SrO trace Cu trace	99.83	2.796
44 A3. III	76.25	15.12	1.86	trace	0.18	trace	1.37	3.10	1.61	0.10				S 0.92 Sb trace	100.51	2.72
45 A2. II	71.19	16.66	0.11	0.77	0.83	1.80	4.79	1.47	1.13	0.19	0.10	trace	none	CO ₂ 0.78 SO ₃ none Cl trace	99.82	2.671
46 A2. II	76.80	13.91	none	1.00	0.77	0.24	1.16	3.04	1.88	0.07	0.14	0.33	0.26	CO ₂ 0.06 FeS ₂ 0.06	99.75	2.73
47 A2. II	73.13	12.21	1.17	1.68	0.65	2.81	3.52	1.98	0.28	0.21	0.85		0.67	CO ₂ 0.88 FeS ₂ 0.20	100.24	2.69
48 B2. III	68.60	10.18	1.34	3.65	4.46	1.59	0.79	2.76	2.38	0.24	1.56	0.15	0.13	CO ₂ 1.32 FeS ₂ 0.06	99.21	2.60
49 A3. III	68.46	12.25	2.27	3.20	2.08	2.63	4.01	2.05	0.83	0.05	0.61		trace	CO ₂ 2.00	100.59	

PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
33	Zalas, near Cracow, Galicia.	Z. Rosen.	Z. Rosen, B. Ac. Sc. Crac., p. 816, 1909 (2).	Porphyry.	Weathered. Cf. No. 145, I.4.2.4.
34	Zalas, near Cracow, Galicia.	R. Zuber.	R. Zuber, Jb. G. R.-A. Wien, XXV, p. 745, 1885.	Porphyry.	In W. T., p. 393.
35	Filipowice, near Cracow, Galicia.	Z. Rosen.	Z. Rosen, B. Ac. Sc. Crac., p. 822, 1909 (2).	Porphyry tuff.	
36	Nordenberg, Ultenthal, Tyrol.	C. v. John.	W. Hammer, Jb. G. R.-A. Wien, LIII, p. 74, 1904.	Garnet porphyry.	
37	Monte Mulatto, Predazzo, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak., p. 119, 1904.	Porphyry.	
38	Käserngrat, Windgälle Mountains, Switzerland.	C. Schmidt.	C. Schmidt, N. J. B. B., IV, p. 432, 1886.	Porphyry.	In W. T., p. 171.
39	Maroggia, Lake Lugano, Switzerland.	A. Schwager.	K. v. Gümbel, Geog. Jhft., VII, p. 70, 1894.	Porphyry.	Not in W. T.
40	Rovio, Lake Lugano, Switzerland.	A. Schwager.	K. v. Gümbel, Geog. Jh. ft., VII, p. 70, 1894.	Porphyry.	Not in W. T.
41	Konyam Bay, Siberia.	A. Lindström.	A. Lindström. Ref. N. J., 1885, I, p. 430.	Feldspar porphyry.	Not in W. T.
42	Jenolan Caves, New South Wales.	W. G. Stone.	G. W. Card, pers. com.	Porphyry.	
43	Jenolan Caves, New South Wales.	W. G. Stone.	G. W. Card, pers. com.	Porphyry.	
44	Diamond Creek, Nillumbik Parish, Victoria.	N. R. Junner.	N. R. Junner, Pr. R. Soc. Vict., XXV (2), p. 340, 1913.	Porphyry.	Altered.
45	Stawell, Victoria.	Not stated.	A. R. Secy Min. Vict. (1907), p. 63, 1908.	Feldspathic dike rock.	Not fresh.
46	Gorge Creek, Ashburton Goldfield, Western Australia.	Not stated.	J. A. Thompson, W. Aust. G. S. B. 33, p. 165, 1909.	Porphyry.	Altered.
47	Norseman, Western Australia.	E. S. Simpson.	W. D. Campbell, W. Aust. G. S. B. 21, p. 119, 1906.	Porphyry.	
48	Bangemall, Gascoyne Goldfield, Western Australia.	Not stated.	J. A. Thompson, W. Aust. G. S. B. 33, p. 161, 1909.	Porphyry.	Altered.
49	Cue, Western Australia.	C. C. Williams.	C. G. Gibson, W. Aust. G. S., B. 14, p. 15, 1904.	Feldspar porphyry.	

PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
50 B3. IV	65.51	18.12	trace	2.39	0.38	2.10	4.27	3.28	0.46	0.07	trace		0.05	CO ₂ FeS ₂ 2.41 0.06	99.10	2.72
51 A2. II	62.16	14.98	0.39	3.03	1.32	4.03	6.18	1.59	0.25	0.07	0.16		0.51	CO ₂ FeS ₂ 5.65 0.60	100.92	2.72
52 A2. II	48.62	22.32	1.08	3.74	2.69	2.12	1.82	5.85	3.61	1.74	0.81	0.25	0.15	CO ₂ SO ₃ 4.63 0.22	99.65	

KERATOPHYRE.

1 A3. III	60.13	20.47	1.04	0.72	1.15	2.59	9.60	1.06	3.44		trace		trace		100.20	2.63
2 A2. II	70.57	15.39	2.77	1.81	1.52	1.66	2.61	2.21	1.12		0.06	0.34	0.05	CO ₂ S 0.24 0.09	100.44	2.668
3 A1. I	69.48	11.99	2.54	2.46	1.16	1.72	3.33	4.01	1.56	0.32	0.14	0.08	0.20	CO ₂ 1.34 FeS ₂ 0.05 NiO 0.03 BaO none SrO none	100.41	
4 A2. II	66.05	13.29	3.22	5.07	1.36	0.50	6.67	0.87	1.88	0.96	0.49	0.09	trace		100.45	
5 A3. III	63.21	19.92	1.74	3.29	1.63	0.78	5.06	1.42	2.28		trace	trace		CO ₂ 0.63	99.96	
6 A3. III	82.45	8.36	2.54	n. d.	0.32	1.73	2.36	0.78	0.23			0.15		CO ₂ 1.04	99.96	2.648
7 A2. II	80.42	9.22	1.22	0.62	0.34	0.86	4.50	0.62	0.66		0.06	0.06		CO ₂ 0.98 SO ₃ 0.04 Org. 0.07	99.67	2.652
8 A2. II	73.62	11.87	0.66	1.21	0.87	3.11	0.37	3.25	2.62		0.06	0.07		CO ₂ 2.42 SO ₃ 0.20	100.33	2.695
9 A2. II	54.41	27.04	1.88	0.11	0.51	2.00	1.14	6.71	3.36		0.54	0.08		CO ₂ 1.22 SO ₃ 0.29 Org. 0.10	99.39	2.754
10 A2. II	56.23	17.22	2.81	1.01	4.85	1.79	4.33	4.81	4.87		1.36	0.21		CO ₂ 0.55 SO ₃ 0.15 Org. 0.07	100.26	2.56
11 A2. II	68.43	14.23	1.39	2.04	1.95	0.28	6.93	0.99	0.48	0.16	0.37	1.04		CO ₂ 1.49 SO ₃ 0.12	99.90	
12 A2. II	51.61	15.99	1.74	9.65	1.69	3.24	5.44	4.07	3.15		1.07	0.52	trace	CO ₂ 2.03 SO ₃ 0.25	100.45	
13 A2. II	49.58	15.24	2.27	11.01	2.59	4.25	4.82	3.58	3.13		1.63	1.03	trace	CO ₂ 0.96 SO ₃ 0.23	100.32	
14 A2. II	45.28	16.74	2.64	10.73	5.47	3.10	5.32	0.58	4.79		2.74	1.65		CO ₂ 0.55 S 0.12 Org. 0.14	99.85	
15 A2. II	75.47	11.80	1.54	0.74	0.40	0.47	5.56	1.45	1.97		0.30	0.12	0.10	S 0.02 Cr ₂ O ₃ 0.21 BaO 0.04	100.19	2.629

PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
50	Boulder, Kalgoorlie, Western Australia.	C. G. Gibson.	E. S. Simpson, W. Aust. G. S. B. 6, p. 73, 1902.	Porphyry.	
51	Boulder, Kalgoorlie, Western Australia.	C. G. Gibson.	E. S. Simpson, W. Aust. G. S. B. 6, p. 73, 1902.	Porphyry.	
52	Waiwhero, Reefton District, New Zealand.	Henderson.	P. G. Morgan, pers. com.	Porphyry.	

KERATOPHYRE.

1	Fair Haven, Connecticut.	H. S. Washington.	E. O. Hovey, A. J. S., II, p. 291, 1897.	Keratophyre.	CO ₂ in H ₂ O. In W. T., p. 205.
2	Cerro de los Llanganates, Ecuador.	A. Lindner.	F. v. Wolff in W. Reiss, Ecuador, III, p. 259, 1904.	Keratophyre.	
3	Gairn an Lairs, near Lennoxtown, Glasgow, Scotland.	E. G. Radley.	G. S. G. B., Sum. Prog. (1907), p. 56, 1908.	Keratophyre.	
4	Trevennen, Mevagissey, Cornwall.	W. Pollard.	Reid and Teall, G. S. Eng. Mem. Sh. 353, p. 56, 1907.	Felsitic ash (keratophyre).	
5	Mehaigne, Belgium.	A. F. Renard.	C. Vallée Poussin, Ref. N. J., 1899, II, p. 65.	Keratophyre tuff.	In W. T., p. 393.
6	Oberhunden, Westphalia.	Bomer.	O. Mücke, N. J. B. B., VIII, p. 568, 1893.	Quartz keratophyre.	In W. T., p. 123.
7	Wibbeke, Westphalia.	Jacobs.	O. Mücke, N. J. B. B., VIII, p. 632, 1893.	Quartz keratophyre.	In W. T., p. 131.
8	Steimel, Eder District, Westphalia.	Gremse.	O. Mücke, N. J. B. B., VIII, p. 651, 1893.	Keratophyre tuff.	In W. T., p. 395.
9	Wibbeke, Westphalia.	Jacobs.	O. Mücke, N. J. B. B., VIII, p. 632, 1893.	Quartz keratophyre.	In W. T., p. 217.
10	Namborner Mühle, Saar-Nahe District, Rheinland.	Gremse.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 290, 1892.	Meso-keratophyre.	In W. T., p. 259.
11	Langenaubach, Hesse-Nassau.	F. Stadler.	R. Brauns, N. J. B. B., XXVII, p. 311, 1909.	Keratophyre.	
12	Wasserweg, Harz.	Not stated.	O. H. Erdmannsdörfer, N. J. Cb., 1909, p. 40.	Keratophyre.	
13	Wasserweg, Harz.	Not stated.	O. H. Erdmannsdörfer, N. J. Cb., 1909, p. 40.	Keratophyre.	
14	Krautberg, near Wienrod, Harz.	Not stated.	O. H. Erdmannsdörfer, N. J. Cb., p. 40, 1909.	Keratophyre mandelstein.	
15	Hydra Island, Greece.	A. Lindner.	Milch and Renz, N. J. B. B., XXXI, p. 523, 1911.	Quartz keratophyre tuff.	

KERATOPHYRE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16 A2. II	72.36	13.47	2.16	0.94	0.21	0.83	4.35	2.25	2.82		0.23	0.09	0.17		99.91	2.655
17 A2. II	69.35	15.61	0.07	1.29	0.99	3.88	4.51	0.40	1.61	0.24	0.75	trace		CO ₂ 1.52	100.22	
18 A3. III	79.18	10.20	0.90	2.26	0.91	0.31	2.30	1.53	1.96						99.56	
19 A3. III	70.77	15.80	0.86	2.74	0.52	0.25	5.03	2.70	1.00						99.66	
20 A1. I	69.41	15.87	0.24	1.58	1.14	1.75	3.42	2.44	0.75	0.16	0.20	0.55	0.16	CO ₂ 2.52 ZrO ₂ trace FeS ₂ 0.07 Cr ₂ O ₃ none V ₂ O ₅ none BaO 0.08	100.34	2.72
21 A2. II	69.02	15.92	0.58	1.96	2.63	0.29	7.48	none	1.02	0.28	0.57	0.28	0.09	CO ₂ 0.14 FeS ₂ 0.11	100.31	

TRACHYTE.

1 A1. I	72.77	12.15	0.44	3.06	0.22	0.07	3.38	4.67	0.55	0.17	0.20	trace	0.16	CO ₂ 2.06 ZrO ₂ 0.04 FeS ₂ 0.12 Cr ₂ O ₃ none BaO 0.03 SrO none	100.09	
2 A2. II	61.15	15.70	4.31	1.12	3.04	2.84	1.54	2.22	7.05		0.69	0.75	trace	SO ₃ 0.18 Li ₂ O none	100.59	
3 A1. I	66.44	14.98	1.57	0.43	0.18	2.47	1.12	3.32	4.06	4.60	0.20	0.11	0.13	CO ₂ 0.67 ZrO ₂ 0.01 Cl trace S 0.02 BaO 0.11 SrO none	100.42	
4 A1. I	64.82	17.71	1.95	0.44	0.22	1.03	4.37	6.09	1.17		0.20	0.05	0.10	CO ₂ 1.32 ZrO ₂ 0.04 SO ₃ none Cl 0.23 Cr ₂ O ₃ none BaO 0.10 SrO trace Li ₂ O none	99.84	2.58
5 A1. I	58.74	15.09	4.66	0.84	2.75	2.68	0.25	8.05	3.09	2.08	0.98	0.40	0.09	CO ₂ 0.61 ZrO ₂ 0.02 S none BaO 0.07 SrO 0.04	100.44	
6 A3. III	56.68	16.62	6.28	n. d.	0.79	0.59	1.03	11.18	3.28		0.22	0.73	1.02	FeS ₂ 2.21 Cu trace	100.63	
7 B1. II	52.64	20.69	2.54	1.82	1.61	3.93	4.84	5.99	2.23	0.28	0.64	0.41	0.07	CO ₂ 0.75 BaO 0.60 SrO 0.21	99.25	
8 A2. II	52.00	18.06	2.18	5.14	2.84	4.59	3.78	4.68	1.84		0.98		0.25	CO ₂ 3.59	99.93	
9 A2. II	65.82	16.37	2.06	0.18	0.51	2.74	4.24	3.48	1.85	0.72	0.40	0.21	0.16	CO ₂ 1.84 BaO 0.03	100.61	
10 A2. II	63.02	15.50	4.81	0.13	0.62	2.67	4.46	3.96	1.49	1.00	0.43	0.16	0.10	CO ₂ 1.82 S 0.03 BaO none	100.20	
11 A1. I	63.12	15.44	1.73	3.53	0.62	1.31	5.81	5.36	0.44	0.14	0.51	0.25	0.27	CO ₂ 1.89 S none NiO none BaO none	100.42	

KERATOPHYRE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	Hydra Island, Greece.	A. Lindner.	Milch and Renz, N. J. B. B., XXXI, p. 528, 1911.	Keratophyre tuff.	
17	Epidauros, Argolis, Greece.	M. Dittrich.	Milch and Renz, N. J. B. B., XXXI, p. 516, 1911.	Quartz keratophyre.	
18	Rybnaja River, Jenissei District, Siberia.	Not stated:	A. Meister, Reg. Aurif. Sib., IX, p. 436, 1910.	Quartz keratophyre.	
19	Rybnaja River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 436, 1910.	Quartz keratophyre.	
20	Boulder, Kalgoorlie, Western Australia.	H. Bowley.	E. S. Simpson, W. Aust. G. S. B. 42 (1), p. 61, 1912.	Keratophyre.	
21	Kalgoorlie, Western Australia.	Surv. lab.	R. A. Farquharson, W. Aust. G. S. B. 51, p. 61, 1913.	Quartz keratophyre.	

TRACHYTE.

1	Quoggy Joe Mountain, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, U. S. G. S. B. 165, p. 166, 1900.	Bostonite.	In W. T., p. 145.
2	Two Ocean Pass, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. B. 148, p. 132, 1897.	Trachyte tuff.	In W. T., p. 397.
3	Idaho Springs, Colorado.	W. T. Schaller.	S. H. Ball, U. S. G. S. P. P. 63, p. 134, 1908.	Biotite latite.	
4	Sunset, Boulder County, Colorado.	R. S. Breed.	R. S. Breed, Pr. Col. Sc. Soc., VI, p. 228, 1889.	Trachyte.	Not in W. T.
5	Goldroad Mine, Mohave County, Arizona.	G. Steiger.	F. C. Schrader, U. S. G. S. B. 397, p. 39, 1909.	Trachyte.	
6	Los Cerillos, New Mexico.	F. W. Clarke.	J. S. Diller, U. S. G. S. B. 42, p. 43, 1887.	Trachyte.	In W. T., p. 397.
7	Phoenix, British Columbia.	M. F. Connor.	O. E. Le Roy, Can. G. S. Mem. XXI, p. 46, 1912.	Augite trachyte.	
8	Onston Ness, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edin., XXXIX, p. 873, 1900.	Bostonite.	In W. T., p. 257.
9	Braid Hill, Pentland Hills, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot. Mem. Sh. 32, p. 37, 1910.	Trachyte.	
10	Moreton Hall, Pentland Hills, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot. Mem. Sh. 32, p. 37, 1910.	Trachyte.	
11	Salen, Mull, Scotland.	E. G. Radley.	G. S. G. B., Sum. Prog. (1912), p. 68, 1913.	Trachyte.	

TRACHYTE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
12	Abercastle, Pembrokeshire, Wales.	J. V. Elsdén.	J. V. Elsdén, Q. J. G. S., LXI, p. 295, 1905.	Lime bostonite.	
13	Killride, County Mayo, Ireland.	J. Weintraube.	Gardiner and Reynolds, Q. J. G. S., LXVIII, p. 93, 1912.	Lime bostonite.	
14	Puy de Dome, Auvergne.	P. Holland.	Dickson and Holland, Pr. Liv. G. Soc., VIII, p. 412, 1899.	Domite.	Decomposed. Not in W. T.
15	Gjeisen, Gran, Norway. *	L. Schmelck.	W. C. Brögger, Eg. Kg., I, p. 131, 1894.	Lindöite (bostonite).	In W. T., p. 195.
16	Tutvet, Hedrum, Loughendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 203, 1899.	Bostonite.	In W. T., p. 197.
17	Lake Maena, Gran, Norway.	V. Schmelck.	W. C. Brögger, Q. J. G. S., I, p. 26, 1894.	Maenaite (bostonite).	Cf. Eg. Kg., III, p. 207, 1899. In W. T., p. 393.
18	Remscheid, Siebengebirge.	von Reis.	H. Laspeyres, D. Siebeng., p. 322, 1901.	Trachyte.	
19	Sporneiche, Odenwald.	W. Sonne.	G. Klemm, Nb. Ver. Erdk. (4), XXVI, p. 19, 1905.	Trachyte.	Altered. Cf. No. 40, I.5.2.4.
20	Hainsfahrt, near Nordlingen, Ries, Bavaria.	E. Schowalter.	E. Schowalter, In. Diss. Erl., p. 45, 1904.	Trachyte tuff.	
21	Mühlözen, near Gaute, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XVII, p. 87, 1897.	Gauteite.	In W. T., p. 259.
22	Königsbachthal, near Nestersitz, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XXIV, p. 303, 1905.	Bostonite.	
23	Grosszinken, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XXIX, p. 421, 1910.	Sodalite gauteite.	No Cl?
24	Rezbanya, Hungary.	L. Tomasowsky.	A. Koch, F. K., XXXV, p. 270, 1905.	Quartz bostonite.	
25	Monte Nuovo, Phlegrean Fields, near Naples, Italy.	Favilli.	C. de Stefani, Pet. Mt. Ergh., No. 156, p. 162, 1907.	Trachyte tuff.	
26	Pianura, Phlegrean Fields, near Naples, Italy.	Manley.	C. de Stefani, Pet. Mt. Ergh., No. 156, p. 162, 1907.	Trachyte tuff.	
27	Dumala, Caucasus.	D. Beljankin.	Loewinson-Lessing, Vh. Rus. M. Ges., XLII, p. 274, 1905.	Dumalite (andesite- trachyte).	
28	Barranco del Almandero, Madeira.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 415, 1912.	Maenaite.	
29	Riding School, Ascension Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 651, 1912.	Trachyte tuff.	
30	Mancayan, Luzon, Philippine Islands.	L. S. Salinger.	A. J. Eveland, Min. Bu. Manila B. 4, p. 43, 1905.	Trachyte.	Altered.
31	Mancayan, Luzon, Philippine Islands.	L. S. Salinger.	A. J. Eveland, Min. Bu. Manila B. 4, p. 43, 1905.	Trachyte.	

TRACHYTE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
32 A3. III	54.80	19.29	1.83	2.54	3.11	8.21	1.55	2.50	4.82	1.58					100.23	
33 A2. II	63.22	13.57	1.50	2.07	1.80	4.56	0.90	3.82	2.10	0.26	0.50		0.09	CO ₂ 6.01	100.48	

MONZONITE.

1 A2. II	54.30	13.63	1.89	2.22	2.13	7.36	0.16	4.41	4.09	2.19	0.61	0.20	0.71	CO ₂ 5.50 SO ₃ none FeS ₂ 0.49 BaO trace ZnO 0.12	100.01	
2 A2. II	73.61	13.97	none	none	none	0.31	0.04	0.06	4.18	0.58	0.60	0.33	trace	CO ₂ none FeS ₂ 5.02 BaO 0.04 SrO trace	99.34	
3 A1. I	58.68	13.52	1.70	2.27	3.29	4.31	3.24	4.06	1.57	0.25	0.99	0.53	trace	CO ₂ 3.49 FeS ₂ 1.56 BaO 0.12 SrO 0.05 Li ₂ O trace	99.73	
4 A1. I	69.61	15.12		0.37	trace	0.05	0.42	4.54	2.01	0.27	0.36	0.04	0.14	CO ₂ none ZrO ₂ 0.02 FeS ₂ 6.92 NiO trace BaO none SrO none ZnS 0.08 PbS 0.06 CuS 0.17	100.18	
5 A1. I	71.14	16.24	0.94	0.16	1.12	0.25	0.07	4.96	2.74	0.49	0.75	0.32	trace	CO ₂ none SO ₃ 0.26 Cl trace V ₂ O ₅ 0.02 BaO 0.05 SrO trace	99.51	
6 A1. I	59.76	15.79	3.77	3.30	2.16	3.88	3.01	4.40	1.11	0.31	0.87	0.42	0.12	CO ₂ 0.78 Cl 0.04 V ₂ O ₅ 0.02 BaO 0.09 SrO trace MoO trace	99.83	
7 A1. I	72.78	15.35	0.55	0.10	0.89	0.14	0.36	5.00	3.22	1.21	0.45	0.05	none	ZrO ₂ trace SO ₃ 0.08 FeS ₂ 0.06 BaO 0.02 SrO none Li ₂ O trace	100.26	
8 A1. I	69.55	16.43	0.46	0.11	0.62	0.15	0.17	5.05	2.69	1.00	0.41	0.05	none	ZrO ₂ trace SO ₃ 0.10 FeS ₂ 3.09 Cu ₂ S 0.07 BaO 0.05 SrO none	100.00	
9 A1. I	46.67	20.92	0.37	0.36	0.85	0.15	0.16	4.33	5.01	0.94	0.43	0.15	none	ZrO ₂ trace SO ₃ 0.18 FeS ₂ 19.18 Cu ₂ S 0.24 ZnS 0.32 MoS ₂ 0.20 BaO 0.04 SrO none	100.50	
10 A1. I	64.88	16.41	0.65		1.12	0.11	0.12	4.96	2.74	0.83	0.38	0.12	trace?	ZrO ₂ trace SO ₃ 0.10 FeS ₂ 4.96 Cu ₂ S 2.42 MoS ₂ none BaO 0.07 SrO none	99.87	
11 A2. II	60.39	13.94	4.07	2.91	2.39	5.17	2.68	1.88	2.76	1.11	0.41	0.07	0.08	CO ₂ 2.10	99.96	
12 A1. I	58.87	17.12	1.96	0.95	1.75	8.00	4.64	4.34	0.81	0.13	0.59	0.20	0.10	CO ₂ 0.84 S 0.09 BaO 0.06 SrO 0.02	100.47	
13 A3. III	62.77	15.04	4.60	1.92	2.30	6.76	2.60	0.08	3.01	0.95				CO ₂ 0.23	100.26	

TRACHYTE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
32	Mancayan, Luzon, Philippine Islands.	L. S. Salinger.	A. J. Eveland, Min. Bu. Manila B. 4, p. 43, 1905.	Trachyte.	
33	Hinchmors Creek, Jenolan Caves, New South Wales.	W. G. Stone.	G. W. Card, pers. com.	Felsite.	

MONZONITE.

1	Original Mine, Butte, Montana.	W. F. Hillebrand.	W. H. Weed, U. S. G. S. P. P. 74, p. 88, 1912.	Quartz monzonite.	Altered.
2	National Belle Mine, Silverton, Colorado.	H. N. Stokes.	F. L. Ransome, U. S. G. S. B. 182, p. 127, 1901.	Monzonite porphyry.	Altered.
3	Yankee Girl Mine, Silverton, Colorado.	H. N. Stokes.	F. L. Ransome, U. S. G. S. B. 182, p. 127, 1901.	Monzonite porphyry.	Altered.
4	Jessie Mine, Breckenridge District, Colorado.	R. C. Wells.	F. L. Ransome, U. S. G. S. P. P. 75, p. 101, 1911.	Quartz monzonite porphyry.	Altered.
5	Tintic Iron Mine, Tintic District, Utah.	H. N. Stokes.	Tower and Smith, U. S. G. S. A. R. 19, III, p. 661, 1899.	Monzonite.	Altered. Cf. No. 15, II.4.3.3. In W. T., p. 391.
6	Iron Duke Mine, Tintic District, Utah.	H. N. Stokes.	Tower and Smith, U. S. G. S. A. R. 19, III, p. 647, 1899.	Monzonite.	Altered. Cf. No. 15, II.4.3.3. In W. T., p. 229.
7	Copper Mountain, Morenci District, Arizona.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. P. P. 43, p. 168, 1905.	Monzonite porphyry.	Altered.
8	Ryerson Mine, Morenci District, Arizona.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. P. P. 43, p. 168, 1905.	Monzonite porphyry.	Silicified. Cf. No. 70, I.4.2.4.
9	Ryerson Mine, Morenci District, Arizona.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. P. P. 43, p. 168, 1905.	Monzonite porphyry.	Altered. Cf. No. 70, I.4.2.4.
10	Humboldt Stopes, Morenci District, Arizona.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. P. P. 43, p. 168, 1905.	Monzonite porphyry.	Altered.
11	Battle Flat, Bradshaw Mountains, Arizona.	G. Steiger.	Jaggard and Palache, U. S. G. S. Fol. 126, p. 5, 1905.	Quartz monzonite porphyry.	
12	Hadley, Kasaan Peninsula, Alaska.	G. Steiger.	C. W. Wright, U. S. G. S. P. P. 87, p. 83, 1915.	Monzonite.	
13	Spring Creek, Shasta County, California.	W. T. Schaller.	B. S. Butler, U. S. G. S. B. 419, p. 137, 1910.	Inclusion in monzonite.	Cf. No. 4, I.3.3.5.

MONZONITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
14 A1. I	60.37	15.96	0.51	1.80	1.63	4.12	3.13	5.07	1.34	0.92	0.71	0.47	0.05	CO ₂ 0.74 ZrO ₂ 0.04 SO ₃ 0.09 FeS ₂ 3.11 CuFeS ₂ 0.20 BaO 0.11 SrO 0.09	100.46	
15 A2. II	53.75	17.48	4.56	3.71	3.20	5.82	3.15	3.71	2.14		0.99	0.24	0.17	CO ₂ 0.79	99.71	
16 A3. III	49.50	21.51	1.13	1.16	2.72	6.70	6.05	1.30	1.36			0.05		FeS 8.85	100.33	
17 A2. II	49.45	22.20	2.87	4.22	1.55	7.70	4.98	1.97	3.52		1.16	0.27			99.89	

DIORITE.

1 A3. III	48.98	17.76	2.14	6.52	20.09	8.36	6.77	2.08	4.50		0.56			CO ₂ 0.82	100.58	
2 A3. III	49.68	15.35	4.53	9.22	4.40	6.92	3.84	2.25	2.14	0.29				CO ₂ 0.64	100.64	
3 A1. I	47.18	16.90	5.21	7.22	3.71	9.69	2.76	0.68	1.66	0.92	2.94	0.38	0.14	CO ₂ 0.63 ZrO ₂ trace Cl trace S 0.22 NiO trace BaO 0.01 SrO trace ZnO 0.03	100.28	
4 A3. III	47.96	16.85	4.33	4.17	9.15	13.25	1.25	0.30	2.89					CO ₂ 0.08	100.23	
5 A1. I	58.01	15.72	0.64	3.87	2.07	2.15	0.10	4.79	2.71	0.31	1.08	0.31	0.17	CO ₂ 2.86 S 1.25 NiO none BaO trace SrO none Fe 1.52 Ni 0.12 Pb 0.86 Cu 0.05 As 1.65	100.24	
6 A2. II	50.20	15.54	2.14	6.49	7.33	11.96	2.03	0.40	2.52	0.43	1.00	0.09	trace	CO ₂ none S 0.03 Cr ₂ O ₃ trace BaO none	100.16	
7 A2. II	50.03	10.89	2.32	7.99	11.84	9.73	1.66	0.57	2.61	0.46	1.23	0.02	trace	CO ₂ 0.78 S trace Cr ₂ O ₃ trace BaO 0.04	100.17	
8 A1. I	46.39	16.17	2.65	9.30	8.58	8.90	2.25	0.73	2.59	0.47	1.59	0.06	trace	CO ₂ none S 0.01 Cr ₂ O ₃ trace NiO trace BaO 0.02 CuO 0.02		
9 A3. III	63.02	17.61	1.78	2.76	1.63	3.30	4.72	3.23	2.03			0.16	trace	BaO 0.08	100.32	2.689
10 A1. I	49.59	14.91	0.52	10.46	2.02	1.96	1.33	3.51	3.17	0.16	1.03	0.47	1.10	CO ₂ 9.40 ZrO ₂ none FeS ₂ 0.36 NiO none BaO 0.07 SrO trace Li ₂ O none Zn, Pb trace	100.06	2.857

MONZONITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
14	Ely Central Mine, Ely, Nevada.	G. Steiger	A. C. Spencer, U. S. G. S. rec. lab.	Monzonite.	Mineralized.
15	Malga Gardone, Predazzo, Tyrol.	M. Dittrich.	J. Romberg, Anh. Abh. Pr. Ak. W., p. 52, 1904.	Syenitic monzonite.	
16	Topsail Point, Tamara Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, N. Arch. Mus., III, p. 78, 1911.	Micromonzonite.	Altered?
17	Maromandia, Ambavatovy, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 230, 1903.	Micromonzonite.	

DIORITE.

1	Near St. John, New Brunswick.	W. D. Matthew.	W. D. Matthew, Tr. N. Y. Ac. Sci., XIV, p. 213, 1895.	Diorite porphyrite.	In W. T., p. 299.
2	Lake Dufresnoy, Kewagama Lake, Quebec.	S. J. Lloyd.	M. E. Wilson, Can. G. S. Mem. 39, p. 48, 1913.	Diorite.	
3	Near Ironstone, Massachusetts.	E. C. Sullivan.	B. K. Emerson, U. S. G. S. B. 419, p. 24, 1910.	Diorite.	
4	Quinneseec Falls, Menominee River, Wisconsin.	R. B. Riggs.	G. H. Williams, U. S. G. S. B. 62, p. 89, 1890.	Gabbrodiorite.	In W. T., p. 331.
5	Croesus Mine, Hailey, Idaho.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 20, III, p. 219, 1900.	Diorite.	Altered. Cf. No. 18. II.4.3.4. In W. T., p. 409.
6	Big Sandstone Creek, Encampment quadrangle, Wyoming.	E. T. Allen.	A. C. Spencer, U. S. G. S. P. P. 25, p. 32, 1904.	Diorite.	Derived from gabbro.
7	Cow Creek, Bridger Peak, Wyoming.	E. T. Allen.	A. C. Spencer, U. S. G. S. P. P. 25, p. 32, 1904.	Diorite.	Altered form of No. 46, III.5.4.4-5.
8	Verdi Mine, Encampment quadrangle, Wyoming.	E. T. Allen.	A. C. Spencer, U. S. G. S. P. P. 25, p. 32, 1904.	Diorite.	Altered norite.
9	McNulty Gulch, Leadville, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. B. 143, p. 176, 1897.	Diorite porphyry.	In W. T., p. 175.
10	Wellington Mine, Breckenridge District, Colorado.	W. T. Schaller.	F. L. Ransome, U. S. G. S. P. P. 75, p. 96, 1911.	Diorite porphyry.	Altered.

DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
11 A1. I	46.62	12.66	trace	11.15	4.02	1.55	1.35	1.68	3.41	0.31	1.01	0.50	0.92	CO ₂ 11.48 ZrO ₂ none FeS ₂ 1.99 Cr ₂ O ₃ none NiO none BaO none SrO none ZnS 0.97 PbS 0.52	100.12	2.930
12 A2. II	45.73	19.45	5.28	3.18	6.24	13.86	0.64	0.32	3.56	1.57	0.23	trace	none	CO ₂ 0.28	100.34	
13 A1. I	58.53	17.74	1.58	1.46	1.71	5.08	5.69	3.90	1.18	0.18	0.81	0.27	0.11	CO ₂ 0.90 ZrO ₂ 0.06 SO ₃ none FeS ₂ 0.96 BaO 0.07 SrO 0.05	100.28	
14 A1. I	64.36	18.18	0.64	0.43	0.28	2.56	8.96	0.89	0.55	0.18	0.17	0.06	0.11	CO ₂ 1.62 ZrO ₂ 0.03 SO ₃ 0.07 FeS ₂ 0.97 BaO 0.06 SrO 0.04	100.16	
15 A1. I	44.69	14.97	0.60	7.05	3.92	10.07	2.36	1.76	0.20	0.36	2.25	0.26	0.14	CO ₂ 8.47 ZrO ₂ 0.02 SO ₃ none FeS ₂ 2.25 FeS ₂ 0.27 BaO 0.14	99.78	
16 A1. I	54.20	15.86	3.32	4.14	3.51	5.32	3.28	3.30	2.40	0.55	1.35	0.68	0.19	CO ₂ 1.45 FeS ₂ 0.26 NiO 0.02 BaO 0.41 SrO 0.04	100.28	
17 A2. II	46.57	13.51	2.92	2.73	2.85	19.92	2.33	2.52	0.53	0.33	0.64	0.27	0.40	CO ₂ 3.40 MoS ₂ 0.78	99.70	
18 A2. II	47.60	16.50	0.76	4.11	4.24	6.44	1.90	3.74	3.82	0.18	0.50	0.04	0.04	CO ₂ 10.75 Cl trace S 0.17	100.79	
19 A2. II	44.34	17.97	1.54	7.31	5.24	6.80	1.10	3.65	5.07	0.28	0.44	0.08	0.05	CO ₂ 8.65 S 0.04	100.56	
20 A3. III	54.15	15.38	4.25	7.32	4.79	7.70	1.25	0.02	3.83	1.02				CO ₂ 0.38	100.09	
21 A3. III	52.13	18.65	4.88	4.42	3.29	10.52	1.55	0.15	3.28	0.65				CO ₂ 0.87	100.39	
22 A2. II	51.07	14.93	6.44	5.98	4.84	7.89	5.04	0.16	1.73	0.24	1.65	0.19	0.22	SO ₃ trace Cl trace F trace	100.38	
23 A2. II	60.96	18.06	1.42	2.48	5.09	6.67	2.39	0.28	1.26		1.10	0.25	0.34	CO ₂ 0.04 S trace	100.34	2.856
24 A2. II	60.35	18.71	2.10	2.15	4.08	7.18	1.54	0.32	1.50		0.70	0.29	0.66	CO ₂ 0.08 S trace	99.67	2.801
25 A1. I	49.83	15.11	9.78	2.57	7.55	8.92	2.84	1.32	1.00		0.16	0.17	0.05	CO ₂ 0.09 ZrO ₂ none Cl 0.02 S none CoO 0.64 BaO none Cu 0.05 Pb 0.01	100.11	
26 A3. III	49.46	16.77	1.98	6.57	9.33	11.17	1.55	0.04	2.02		0.79	trace	trace	CO ₂ 0.27 S trace	99.95	

DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
11	Wellington Mine, Breckenridge District, Colorado.	W. T. Schaller.	F. L. Ransome, U. S. G. S. P. P. 75, p. 96, 1911.	Diorite porphyry.	Altered.
12	Yava Wash, Bradshaw Mountains, Arizona.	G. Steiger.	Jaggar and Palache, U. S. G. S. Fol. 126, p. 4, 1905.	Diorite.	Altered.
13	Treadwell Mine, Douglas Island, Alaska.	G. Steiger.	A. C. Spencer, U. S. G. S. B. 287, p. 101, 1906.	Albite diorite.	Altered.
14	Treadwell Mine, Douglas Island, Alaska.	G. Steiger.	A. C. Spencer, U. S. G. S. B. 287, p. 101, 1906.	Albite diorite.	Altered.
15	Treadwell Mine, Douglas Island, Alaska.	G. Steiger.	A. C. Spencer, U. S. G. S. B. 287, p. 63, 1906.	Diorite.	Altered.
16	Silver Bow Basin, Alaska.	W. F. Hillebrand.	G. F. Becker, U. S. G. S. B. 148, p. 233, 1897.	Diorite.	In W. T., p. 269.
17	Jumbo Mine, Copper Mountain, Alaska.	R. C. Wells.	C. W. Wright, U. S. G. S. P. P. 87, p. 106, 1915.	Diorite.	Altered.
18	Lillooet, British Columbia.	M. F. Connor.	A. M. Bateman, Can. G. S. rec. lab.	Diorite.	Altered. Cf. No. 78, II.5.3.4.
19	Lillooet, British Columbia.	M. F. Connor.	A. M. Bateman, Can. G. S. rec. lab.	Diorite.	Altered. Cf. No. 78, II.5.3.4.
20	Minnesota Mine, Shasta County, California.	W. T. Schaller.	B. S. Butler, U. S. G. S. B. 419, p. 138, 1910.	Diorite.	Altered.
21	Uncle Sam Mine, Shasta County, California.	W. T. Schaller.	B. S. Butler, U. S. G. S. B. 419, p. 138, 1910.	Diorite porphyry.	
22	Forbestown, Butte County, California.	H. N. Stokes.	H. W. Turner, U. S. G. S. A. R. 17, I, p. 731, 1896.	Uralite diorite.	In W. T., p. 327.
23	Smiths Post Island, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 43, 1900.	Diorite.	Altered. In W. T., p. 249.
24	Smiths Post Island, Essequibo River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 43, 1900.	Diorite.	In W. T., p. 249.
25	Mazaruni District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Br. Gui., p. 48, 1908.	Epidiorite.	Altered gabbro. In W. T., p. 321.
26	Arakaka District, British Guiana.	J. B. Harrison.	J. B. Harrison, Goldf. Bri. Gui., p. 48, 1908.	Epidiorite.	

DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
27 A3. III	52.47	12.15	3.47	5.23	9.94	9.71	2.81	2.26	1.62					CO ₂ 0.54	100.20	
28 A1. I	49.74	14.85	1.04	10.61	2.48	6.17	4.52	0.53	3.37	0.05	2.05	0.62	0.39	CO ₂ 3.18 Cl trace FeS ₂ 0.13 NiO none BaO none	99.73	
29 A1. I	42.36	14.09	2.17	10.48	5.70	10.05	3.26	0.80	2.92	0.12	4.95	1.02	0.28	CO ₂ 1.73 Cl trace NiO 0.09 BaO none	100.02	
30 A1. I	44.10	13.63	0.76	11.35	5.58	7.96	1.26	4.34	2.05	0.17	3.07	0.22	0.85	CO ₂ 5.18 FeS ₂ 0.09 NiO 0.04 BaO none	100.15	
31 A3. III	53.35	17.10	0.09	6.67	7.02	5.92	3.32	2.03	4.00		0.91			FeS ₂ 0.28	100.69	
32 A2. II	49.47	17.47	2.56	6.70	6.11	9.36	2.52	2.31	1.58		0.70	0.18	0.20	CO ₂ 0.75	100.01	
33 A2. II	43.22	18.95	10.73	1.72	2.08	18.40	0.41	2.09	1.04		0.50	0.12	0.70	S 0.27	100.23	
34 A2. II	57.35	14.61	2.18	3.99	3.96	3.51	2.93	1.92	4.08		0.81	0.25		CO ₂ 4.16 SO ₃ 0.20 Org. 0.02	99.97	2.666
35 A2. II	57.28	15.98	2.35	5.06	5.52	2.84	2.37	3.42	4.22		1.01	0.18		CO ₂ 0.41 SO ₃ trace	100.64	2.653
36 A2. II	56.69	14.99	3.39	4.38	3.39	5.92	3.30	2.05	3.43		1.34	0.22		CO ₂ 1.00 SO ₃ 0.15	100.25	2.67
37 A2. II	54.55	15.44	3.48	0.80	4.41	7.85	2.45	4.09	3.75		0.96	0.45		CO ₂ 2.16 SO ₃ 0.10	100.49	2.67
38 B2. III	53.54	17.82	5.39	4.21	1.97	7.47	3.27	1.95	1.94		0.28	trace	0.52	CO ₂ 0.85 SrO 0.09 trace	99.36	
39 A2. II	55.94	18.17	1.99	1.96	1.73	9.35	5.94	1.07	1.06		0.83	0.32	0.21	CO ₂ 1.45	100.02	
40 A3. III	52.23	16.57	7.01	1.42	3.93	5.97	2.85	3.05	3.84	0.57	2.68				100.10	2.88
41 A3. III	49.43	15.36	1.90	7.62	8.22	10.86	3.24	0.22	2.29		0.79				99.93	
42 A3. III	48.70	16.27	2.00	9.27	6.68	10.06	3.15	0.54	2.91		0.81				100.39	
43 A3. III	47.39	17.30	2.85	8.75	5.97	10.37	2.63	1.84	3.05		0.62				100.77	
44 A2. II	47.00	19.42	1.17	10.20	4.71	10.35	3.14	0.96	1.58		0.98		0.08		99.59	
45 A2. II	46.68	15.32	1.06	10.00	9.25	10.86	2.80	0.24	2.06		1.77		0.04		100.08	
46 A3. III	45.86	21.93	3.82	5.54	5.14	12.98	0.43	2.21	2.16						100.07	

DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
27	Inchnadampf, Assynt, Scotland.	J. J. H. Teall.	J. J. H. Teall, G. Mag., XXIII, p. 350, 1886.	Diorite.	In W. T., p. 321.
28	Ardifuar, Crinan Loch, Argyll, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem. Sh. 36, p. 55, 1909.	Epidiorite.	
29	Ardifuar, Crinan Loch, Argyll, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem. Sh. 36, p. 55, 1909.	Epidiorite.	
30	Glencalvie Lodge, Rossshire, Scotland.	E. G. Radley.	G. S. G. B., Sum. Prog. (1911), p. 58, 1912.	Epidiorite.	
31	Saint-Pons, Esterel, France.	Pisani.	A. Michel-Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 41, 1912.	Microdiorite.	
32	Langban, Wermland, Sweden.	G. Nyblom.	H. J. Sjogren, G. F. F., XXXII, p. 1307, 1910.	Diorite.	Not fresh.
33	Langban, Wermland, Sweden.	G. Nyblom.	H. J. Sjogren, G. F. F., XXXII, p. 1307, 1910.	Diorite.	Altered.
34	Litzel Kopf, near Buhlenberg, Birkenfeld, Harz.	Bärwald.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 266, 1892.	Diorite porphyrite.	In W. T., p. 409.
35	Steinhübel, near St. Wendel, Harz.	Hesse.	K. A. Lossen, Jb. Pr. G. L.-A., X (1889), p. 266, 1892.	Diorite porphyrite.	In W. T., p. 229.
36	Werscheiler, near St. Wendel, Harz.	Böttcher.	K. A. Lossen, Jb. Pr. G. L.-A., X (1889), p. 266, 1892.	Diorite porphyry.	In W. T., p. 243.
37	Gronig, near St. Wendel, Harz.	Hesse.	K. A. Lossen, Jb. Pr. G. L.-A., X (1889), p. 266, 1892.	Diorite porphyry.	In W. T., p. 271.
38	Kohldorf, Krasso-Szoreny, Hungary.	K. Emszt.	Rozlozsnit and Emszt, Mt. Ung. G. A., XVI, p. 192, 1908.	Diorite.	
39	Val Riccoletta, Monzoni, Tyrol.	Dittrich and Pohl.	J. Romberg, Anh. Abh. Pr. Ak. w., p. 89, 1904.	Diorite aplite.	
40	Spescha, Engadine, Switzerland.	L. Hezner.	u. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 228, 1909.	Gabbro-diorite.	
41	Weressowsky Ouwae, Iss District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 360, 1910.	Gabbro-diorite.	
42	Borowskol, Tswettli-Bor, Iss District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 360, 1910.	Gabbro-diorite.	Altered.
43	Weressowsky Ouwae, Iss District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 360, 1910.	Gabbro-diorite.	
44	Mount Bielaia, Tagil District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 360, 1910.	Diorite.	Uralitized gabbro.
45	Mount Maminikha, Tagil District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 360, 1910.	Gabbro-diorite.	
46	Garevaia, Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 500, 1905.	Diorite pegmatite.	

DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
47 A3. III	40.30	17.63	6.35	10.28	8.23	13.85	2.48	0.26	0.92					Cr ₂ O ₃ 0.34	100.64	
48 A3. III	64.87	14.28	5.75	n. d.	2.01	5.47	3.51	0.87	1.70	0.24	0.42	0.20		CO ₂ 1.06	100.38	
49 B2. III	51.18	17.44	4.70	4.15	2.87	9.60	5.84	0.44	1.46		2.40	0.79	0.10		100.97	
50 A3. III	47.63	17.20	3.60	8.09	6.25	6.42	4.65	1.31	2.71	0.73	1.39	trace		CO ₂ 0.44 FeS ₂ 0.53	100.95	2.893

PORPHYRITE.

1 A1. I	54.69	16.53	4.54	2.83	2.99	5.34	5.19	3.93	1.05	0.32	0.91	0.73	0.07	CO ₂ 0.83 Cl trace BaO 0.37 SrO 0.06	100.38	
2 A2. II	52.33	15.09	4.31	4.03	6.73	7.06	3.14	3.76	2.68		0.14	1.02	0.09	BaO 0.07	100.45	2.785
3 A2. II	49.47	12.15	1.93	4.07	10.86	9.30	2.08	2.42	4.14		0.21	0.37	0.10	CO ₂ 3.31 Cr ₂ O ₃ trace BaO 0.03	100.44	
4 A2. II	64.81	15.73	1.68	2.91	2.82	4.22	3.98	1.43	0.62		0.08	0.23	0.08	CO ₂ 1.08 Cl 0.04 FeS ₂ 0.90 SrO trace	100.61	2.740
5 A3. III	56.62	16.74	4.94	3.27	4.08	7.39	3.50	1.97	0.92			trace	0.15	CO ₂ 1.15 SrO trace	100.73	2.768
6 A2. II	71.19	13.81	1.45	1.68	0.74	2.87	4.24	1.82	0.92	0.15	0.35	0.08	0.07	CO ₂ 0.82 BaO 0.16 SrO trace	100.35	
7 A1. I	68.58	13.04	0.26	3.40	1.01	3.22	4.94	1.90	1.00	0.16	0.57	0.20	0.15	CO ₂ 1.31 FeS ₂ 0.15 BaO 0.10 SrO trace	99.99	
8 A3. III	63.82	16.53	1.28	2.93	1.99	5.57	4.12	0.77	1.82		trace		trace	CO ₂ 1.10	99.93	2.689
9 A3. III	55.77	15.88	2.55	9.20	10.09	3.11	2.30	0.23	1.00		0.09	trace	trace	CO ₂ trace Cl trace	100.22	
10 A3. III	63.59	18.63	0.56	1.62	4.98	2.14	1.78	2.07	4.24	0.14	trace	none	trace	CO ₂ 0.65	100.40	
11 A3. III	65.16	15.56	2.11	3.39	2.40	6.70	2.54	1.47	1.11				0.36		100.80	
12 A3. III	48.64	11.68	10.57	6.31	6.78	10.88	2.90	1.01	1.02				0.39		100.18	
13 A2. II	58.21	15.54	6.52	1.78	2.60	4.40	2.96	2.58	0.56		2.09	0.32	0.26	CO ₂ 2.70	100.52	
14 A2. II	60.96	13.93	1.56	3.65	1.59	3.98	2.83	4.23	2.14		1.16	0.29		CO ₂ 3.27 SO ₃ 0.16	99.75	2.625

DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
47	Koswinsky Kamen, Kitlin District, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 171, 1902.	Issite (anorthite diorite).	
48	Kernize, Montenegro.	E. Manasse.	E. Manasse, Mem. d' Achl., p. 86, 1903.	Diorite porphyry.	
49	Porto Grande, Sao Vincente, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 287, 1896.	Diorite.	In W. T., p. 285.
50	Navigation Creek, Noyang, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XX, p. 53, 1884.	Diorite.	In W. T., p. 283.

PORPHYRITE.

1	Northern part of Crazy Mountains, Montana.	W. F. Hillebrand.	J. E. Wolff, U. S. G. S. B. 148, p. 143, 1897.	Porphyrite.	In W. T., p. 261.
2	Cottonwood Creek, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 648, 1895.	Augite porphyrite.	In W. T., p. 267.
3	East Gallatin River, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 645, 1895.	Porphyrite (lamprophyre).	In W. T., p. 413.
4	Mosquito Amphitheater, Leadville, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. Mon. 12, p. 340, 1886.	Biotite porphyrite.	In W. T., p. 233.
5	Buckskin Gulch, Mosquito Range, Leadville, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. Mon. 12, p. 340, 1886.	Hornblende porphyrite.	In W. T., p. 277.
6	Milton, Calaveras County, California.	W. F. Hillebrand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 484, 1894.	Quartz porphyrite.	In W. T., p. 179.
7	Latrobe, Eldorado County, California.	W. F. Hillebrand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 473, 1894.	Porphyrite.	In W. T., p. 225.
8	Santa Catalina Island, California.	W. S. T. Smith.	W. S. T. Smith, Pr. Cal. Ac. Sci. (3), Geol. I, p. 25, 1897.	Porphyrite.	In W. T., p. 245.
9	Barama River, British Guiana.	J. B. Henderson.	J. B. Henderson, G. Goldf. Br. Gui., p. 61, 1908.	Porphyrite.	
10	Bahia Rodriguez, Skyring Water, Patagonia.	M. Dittrich.	P. Quensel, B. G. Inst. Un. Ups., XII, p. 31, 1913.	Porphyroid.	
11	Löytökorpi, Kankaanpää, Finland.	H. Berghell.	J. J. Sederholm, B. C. G. Fin., No. 6, p. 74, 1897.	Mica porphyrite.	Altered.
12	Pikonkörpi, Kalvola, Finland.	A. W. Forsberg.	J. J. Sederholm, Fin. G. Und., Bl. 18, p. 49, 1890.	Uralite porphyrite.	In W. T., p. 322.
13	Grafäslan, near Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Afk. Sv. G. Und., No. 181, p. 73, 1899.	Porphyrite.	In W. T., p. 241.
14	Weiselberge, near Oberkirchen, Rheinland.	Böttcher.	K. A. Lossen, Z. D. G. G., XLIII, p. 537, 1891.	Porphyrite.	In W. T., p. 223.

PORPHYRITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
15 A2. II	50.81	15.90	3.60	3.72	7.18	3.67	3.32	0.81	6.80		1.06	0.27		CO ₂ 2.35 SO ₃ 0.21 Org. 0.05	99.75	2.643
16 A2. II	58.40	16.81	3.47	2.69	3.90	1.54	4.48	5.03	2.66		0.25	0.43		CO ₂ 0.48 SO ₃ trace	100.14	2.642
17 A2. II	58.40	15.61	2.72	2.94	3.50	3.97	3.13	5.37	1.72		0.38	0.40		CO ₂ 2.56 SO ₃ trace	100.70	2.674
18 A2. II	56.29	15.52	5.28	0.84	5.31	2.47	3.46	5.26	3.86		trace	0.37		CO ₂ 0.95 SO ₃ 0.16	99.77	2.660
19 A2. II	53.92	16.60	6.87	0.99	4.26	3.54	3.22	7.45	2.15		1.08	0.62		SO ₃ 0.13	100.83	2.709
20 A2. II	62.44	15.60	2.09	3.43	2.11	1.70	3.99	4.21	2.60		0.88	0.16		CO ₂ 0.62 SO ₃ 0.12	99.95	2.652
21 A2. II	61.83	14.80	1.83	5.31	2.69	0.73	3.57	4.54	2.49		1.17	0.23		CO ₂ 0.08 SO ₃ 0.18	99.55	2.656
22 A2. II	61.41	14.54	1.96	5.80	2.03	1.33	3.86	4.68	2.48		0.98	0.26		CO ₂ 0.88 SO ₃ trace	100.21	2.663
23 A2. II	58.58	15.26	5.61	3.28	3.02	0.98	2.45	3.80	5.14		1.38	0.37		SO ₃ 0.07	99.94	2.674
24 A2. II	61.31	16.34	2.23	3.17	2.07	2.43	4.86	2.96	3.08		0.77	0.27		CO ₂ 1.08 SO ₃ 0.14 Org. 0.02	100.93	2.624
25 A2. II	57.85	17.20	5.04	1.53	2.81	6.69	3.21	2.26	2.00		0.83	0.15		CO ₂ 0.85 SO ₃ 0.14	100.56	2.676
26 A3. III	61.93	18.83	3.24	1.24	2.37	4.46	4.16	2.72	1.83						100.78	2.62
27 A2. II	59.60	14.30	1.49	6.43	1.49	4.54	2.90	1.84	4.63		1.12	0.24		CO ₂ 2.02 SO ₃ 0.19 Org. 0.02	100.81	2.646
28 A2. II	57.12	15.40	2.80	4.39	5.13	2.24	2.84	3.77	4.35		1.17	0.22		CO ₂ 0.75 SO ₃ 0.08	100.26	2.625
29 A2. II	55.47	13.86	5.98	2.64	3.65	2.75	3.63	4.35	2.94		1.19	0.22		CO ₂ 3.25 SO ₃ 0.14	100.07	2.683
30 A2. II	54.70	18.05	3.63	3.31	3.90	6.36	4.08	1.97	3.28		1.09	trace		SO ₃ 0.13	100.50	2.684
31 A2. II	54.32	17.36	2.32	6.14	3.04	3.11	3.83	3.27	4.52		1.18	trace		CO ₂ 1.51 SO ₃ 0.08	100.68	2.665
32 A3. III	59.07	20.06	2.05	5.17	0.45	3.35	8.29	0.21	0.47	0.63				CO ₂ 0.51	100.26	
33 A3. III	68.04	16.14	4.32	0.97	1.02	0.32	7.62	0.58	1.27						100.28	
34 A3. III	50.96	17.33	2.66	5.94	12.73	0.78	0.88	2.32	7.13				0.10		100.83	2.746

PORPHYRITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
15	Oberstein, Nahethal, Rheinland.	Bärwald.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 309, 1892.	Labradorite porphyrite.	In W. T., p. 413.
16	Kreiseberg, Thüringerwald, Thuringia.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L.-A., IX, p. 300, 1889.	Biotite porphyrite.	In W. T., p. 259.
17	Unterneubrunn, Thüringerwald, Thuringia.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L.-A., VIII, p. 108, 1888.	Mica porphyrite.	In W. T., p. 259.
18	Gotteskopf, near Ilmenau, Thuringia.	K. Klüss.	H. Loretz, Jb. Pr. G. L.-A., XIII, p. 135, 1893.	Porphyrite.	In W. T., p. 259.
19	Langewiesen, near Ilmenau, Thuringia.	Hesse.	H. Loretz, Jb. Pr. G. L.-A., XIII, p. 135, 1893.	Porphyrite.	In W. T., p. 259.
20	Bullerberg, near Magdeburg, Prussia.	Hesse.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 210, 1892.	Porphyrite.	In W. T., p. 223.
21	Supplingen, near Magdeburg, Prussia.	Hampe.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 159, 1892.	Porphyrite.	In W. T., p. 221.
22	Altenhausen, near Magdeburg, Prussia.	G. F. Steffen.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 159, 1892.	Porphyrite.	In W. T., p. 223.
23	Zissendorfer Berg, near Magdeburg, Prussia.	Fischer.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 210, 1892.	Porphyrite.	In W. T., p. 225.
24	Horst, Bl. Lebach, Prussia.	Gremse.	Weiss and Grebe, Erl. G. Kt. Pr., Bl. Lebach, p. 32, 1889.	Porphyrite.	In W. T., p. 227.
25	Himmelberg, Bl. Lebach, Prussia.	Hampe.	Weiss and Grebe, Erl. G. Kt. Pr., Bl. Lebach, p. 34, 1889.	Porphyrite.	In W. T., p. 243.
26	Kesselsdorf, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 750, 1886.	Porphyrite.	In W. T., p. 191.
27	Niederbrombach, Oberstein, Harz.	Böttcher.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 293, 1892.	Porphyrite.	Variolitic. In W. T., p. 243.
28	Bosenberg, near St. Wendel, Harz.	Jacobs.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 266, 1892.	Porphyrite.	In W. T., p. 225.
29	Spiemont, Harz.	Böttcher.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 266, 1892.	Porphyrite.	In W. T., p. 225.
30	Herchweiler, n. St. Wendel, Harz.	Fischer.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 316, 1892.	Porphyrite.	In W. T., p. 281.
31	Pfeffelbach, n. St. Wendel, Harz.	Fischer.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 316, 1892.	Porphyrite.	In W. T., p. 265.
32	Hidas, Tur-Toroczko Range, Hungary.	S. Szentpetry.	S. Szentpetry, Muz. Fuz., I, p. 238, 1912.	Porphyrite tuff.	
33	Pozoritta, Bukowina.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLIX, p. 561, 1899.	Albite porphyrite.	In W. T., p. 157.
34	Bruneck, Tyrol.	S. Hillebrand.	S. Hillebrand, T. M. P. M., XXV, p. 477, 1907.	Porphyrite.	Altered.

PORPHYRITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
35 A3. III	55.50	18.12	2.08	6.17	2.75	1.33	5.60	0.77	3.44	0.72	0.45		trace	CaCO ₃ 2.68	99.61	
36 A2. II	54.84	18.15	2.06	4.29	6.12	3.90	0.80	0.89	4.22	0.60	2.00	Ca ₃ P ₂ O ₈ 1.29	0.37	CO ₂ FeS ₂ trace 0.11	99.94	2.75
37 A2. II	35.84	10.08	3.68	4.69	35.81	0.12	0.49	0.56	3.34	0.70	2.50	Ca ₃ P ₂ O ₈ 1.40	0.48	FeS ₂ 0.07	99.76	2.75
38 A2. II	51.30	16.13	3.01	6.92	2.58	6.97	4.00	2.07	1.89	0.50	2.78		0.19	CO ₂ 1.64 NiO 0.05 BaO none SrO trace	100.03	
39 A?3. III	65.05	10.04	8.47	5.14	trace	4.80	3.39	0.56						CO ₂ 1.53	100.35	
40 A1. I	65.66	13.55	1.63	1.56	1.56	5.46	5.00	1.96	0.46	0.10	0.50	0.54	0.23	CO ₂ 1.58 ZrO ₂ 0.02 Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.01 BaO 0.03	99.88	2.75
41 A3. III	63.05	14.04	n. d.	5.36	1.58	5.92	6.74	0.62	0.26	0.04	0.97		0.02	CO ₂ 1.47	100.07	2.75
42 A2. II	64.54	12.65	2.33	2.12	2.72	4.92	3.78	2.12	1.83	0.08	0.77		none	CO ₂ FeS ₂ none 0.13	99.73	
43 A2. II	57.76	11.89	2.97	4.85	1.86	6.15	4.46	1.46	1.54	0.23	2.95	0.71	0.30	CO ₂ 2.80 FeS ₂ 0.06 C 0.30	100.09	
44 A2. II	56.96	15.19	1.13	4.17	3.75	5.40	3.79	0.65	4.71	0.07	0.74		0.68	CO ₂ 3.43 S trace	100.87	

ANDESITE.

1 A2. II	58.91	13.43	none	7.15	5.63	6.68	2.91	1.31	1.48		1.23	0.15		CO ₂ 1.35	100.23	
2 A3. III	63.25	14.89	6.54	none	0.82	0.59	4.47	4.78	3.20		trace	0.61		CO ₂ 0.78	99.93	
3 A2. II	45.30	16.07	8.26	2.17	5.58	5.63	2.44	4.06	2.93	0.30	1.70	0.43	0.20	CO ₂ 4.78	99.85	
4 A2. II	51.08	11.37	11.17	5.64	3.96	5.20	5.54	1.50	1.31	0.19	2.67	0.39	0.22		100.24	
5 A3. III	66.28	10.62	6.41	2.11	1.15	3.17	6.09	1.73	0.61					CO ₂ 1.47	99.64	
6 A3. III	64.12	16.32	6.72	1.38	0.33	3.49	6.22	0.53	0.34		trace		0.64	CO ₂ none	100.09	
7 A2. II	63.69	18.60	0.94	0.09	0.18	0.24	0.32	12.81	1.14	0.51	0.32	0.10	0.34	CO ₂ none SO ₃ 0.30 BaO 0.37	99.93	
8 A2. II	60.78	18.10	3.15	0.97	2.04	4.61	2.81	2.75	2.62	0.68	0.24	0.62	0.39	CO ₂ none SO ₃ 0.16 BaO 0.18	100.10	
9 A2. II	57.35	16.33	1.47	2.58	4.31	6.12	0.70	3.82	3.05	0.62	0.65	0.16	0.30	CO ₂ 0.70 SO ₃ 2.43 BaO 0.05	100.64	

PORPHYRITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
35	Ananadura, near Kavkaz, Caucasus.	D. Beljankin.	D. Beljankin, Ann. Inst. Pet. Gr., XV, 1911.	Porphyrite.	
36	Zeia River, Amur District, Siberia.	P. Todakis.	E. Ahnert, Reg. Aurif. Sib., X, Tab. VII, 1910.	Porphyrite tuff.	
37	Zeia River, Amur District, Siberia.	P. Todakis.	E. Ahnert, Reg. Aurif. Sib., X, Tab. VII, 1910.	Augite porphyrite.	
38	Oakey Creek, near Mount Odin, Nandewar Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 904, 1908.	Labradorite porphyry.	
39	Dandenong, Victoria.	H. C. Jenkins.	J. W. Gregory, Pr. R. Soc. Vict., XIV, p. 201, 1902.	Porphyrite.	MgO?
40	Kalgoorlie, Western Australia.	H. Bowley.	Simpson and Gibson, W. Aust. G. S. B. 42, p. 61, 1912.	Porphyrite.	
41	Kalgoorlie, Western Australia.	C. C. Williams.	E. S. Simpson, W. Aust. G. S. B. 6, p. 74, 1902.	Porphyrite.	
42	Mount Monger, Western Australia.	Survey laboratory.	R. A. Farquharson, W. Aust. G. S. B. 53, p. 59, 1913.	Porphyrite.	Altered.
43	Mount Monger, Western Australia.	Survey laboratory.	R. A. Farquharson, W. Aust. G. S. B. 53, p. 60, 1913.	Porphyrite.	
44	Mount Monger, Western Australia.	Survey laboratory.	R. A. Farquharson, W. Aust. G. S. B. 53, p. 61, 1913.	Porphyrite.	

ANDESITE.

1	Jernpynten, Disko Island, Greenland.	M. Dittrich.	T. Nicolau, Medd. Gron., XXIV, p. 243, 1900.	Andesite.	Iron bearing. Not in W. T.
2	North Haven, Fox Islands, Maine.	Magruder and Jones.	G. O. Smith, In. Diss. Johns Hop., p. 33, 1896.	Andesite.	In W. T., p. 419.
3	Neponset Valley, Massachusetts.	W. T. Hall.	F. Bascom, J. Ac. Sci. Phila. (2), XV, p. 155, 1912.	Andesite.	
4	Front Royal, Virginia.	G. Steiger.	A. Keith, U. S. G. S. A. R. 14, p. 305, 1894.	Andesite.	In W. T., p. 313.
5	Healing Springs, Davidson County, North Carolina.	J. E. Pogue.	J. E. Pogue, A. J. S., XXVIII, p. 228, 1909.	Andesite.	Also in N. C. G. S. B. 22, p. 67, 1910.
6	Virgilina, Granville County, North Carolina.	T. L. Watson.	T. L. Watson, B. G. S. A., XIII, p. 364, 1902.	Andesite.	Altered.
7	Keating Mine, Radersburg, Montana.	C. Palmer.	A. N. Winchell, U. S. G. S. rec. lab.	Andesite.	Much altered. Cf. No. 18, II.4.3.4.
8	Keating Mine, Radersburg, Montana.	C. Palmer.	A. N. Winchell, U. S. G. S. rec. lab.	Andesite.	Weathered. Cf. No. 18, II.4.3.4.
9	Keating Mine, Radersburg, Montana.	C. Palmer.	A. N. Winchell, U. S. G. S. rec. lab.	Andesite.	Altered. Cf. No. 18, II.4.3.4.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
10 A2. II	54.97	18.38	3.06	4.22	2.38	5.43	3.45	3.37	0.82		0.97	0.42	trace	CO ₂ 2.92 SO ₃ 0.03 Cl trace Li ₂ O 0.03	100.45	
11 A1. I	54.61	15.23	3.51	4.80	4.69	7.41	1.46	2.70	2.47	0.32	0.86	0.35	0.09	CO ₂ 1.46 ZrO ₂ none SO ₃ none Cl none BaO 0.11 SrO 0.04	100.11	
12 A1. I	52.47	18.23	3.31	3.85	2.85	4.56	4.83	3.81	2.03	0.68	0.97	0.64	0.15	CO ₂ 1.01 ZrO ₂ 0.02 FeS ₂ 0.04 Cr ₂ O ₃ trace V ₂ O ₅ 0.03 NiO trace BaO 0.23 SrO 0.11	99.82	
13 A1. I	50.72	16.01	4.35	4.20	7.06	9.02	2.92	1.13	2.14	0.40	1.08	0.29	0.07	CO ₂ 0.85 Cr ₂ O ₃ none NiO none BaO 0.11 SrO 0.09	100.44	
14 A2. II	50.06	17.00	2.96	5.42	3.61	8.14	3.53	3.40	4.85		0.51	0.66	0.14		100.28	
15 A1. I	85.49	5.49	0.23	0.25	none	0.27	none	none	3.07	0.46	0.63	0.07	none	CO ₂ none SO ₃ 0.46 FeS ₂ 3.43 BaO 0.07	99.92	
16 A1. I	64.79	18.93	none	none	none	0.43	0.15	0.24	5.39	0.50	1.21	0.51	none	CO ₂ none FeS ₂ 7.19 BaO 0.06 SrO trace	99.40	
17 A1. I	55.61	16.40	5.44	2.37	3.25	5.85	2.61	3.77	1.51	0.46	1.10	0.45	0.09	CO ₂ 1.33 S trace BaO 0.03 SrO 0.05	100.32	
18 A2. II	58.36	16.13	3.85	3.25	2.91	3.57	4.51	2.41	1.61		1.49		0.66	CO ₂ 1.54	100.29	2.655
19 A3. III	55.77	16.38	4.27	4.17	3.10	6.66	3.65	2.37	2.36		0.34			CO ₂ 1.58	100.65	2.745
20 A3. III	67.13	18.41	0.45	0.07	0.44	0.55	4.17	5.28	2.98		0.30	trace	trace		99.78	
21 A3. III	63.88	19.96	2.21	0.57	0.58	2.03	4.19	3.88	2.63				trace		99.93	
22 A1. I	66.44	14.98	1.57	0.43	0.18	2.47	1.12	3.32	4.06	4.60	0.20	0.11	0.13	CO ₂ 0.67 ZrO ₂ 0.01 Cl trace S 0.02 BaO 0.11 SrO none	100.42	
23 A2. II	57.55	15.52	2.68	2.48	1.37	5.85	4.90	2.95	2.15		0.24	0.83		CO ₂ 3.57 ZrO ₂ trace Cl trace S trace V ₂ O ₅ 0.02	100.21	
24 A2. II	57.19	17.12	0.76	3.15	1.69	4.32	0.57	3.22	4.06	1.57	0.53	0.13	0.17	CO ₂ 4.94 S 0.28 BaO 0.27	99.97	
25 A2. II	56.36	11.51	5.82	1.18	1.42	0.44	1.30	0.54	9.80	8.32	0.87	0.35	0.08	ZrO ₂ none SO ₃ 2.50 BaO 0.04	100.53	
26 A3. III	65.80	14.48	3.96	0.70	2.35	3.19	3.78	3.32	2.71	0.12		0.12		BaO 0.06	100.59	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	Bald Mountain, Bear Gulch, Montana.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. B. 148, p. 129, 1897.	Shoshonite.	In W. T., p. 267.
11	Daylight, Zosel District, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. B. 168, p. 119, 1900.	Andesite porphyry.	In W. T., p. 247.
12	Dike Mountain, Yellowstone National Park.	W. F. Hillebrand.	Hague and Jaggar, U. S. G. S. B. 168, p. 98, 1900.	Trachyte-andesite.	In W. T., p. 261.
13	Eagle Creek, Yellowstone National Park.	H. N. Stokes	Hague and Jaggar, U. S. G. S. B. 168, p. 97, 1900.	Andesite.	In W. T., p. 321.
14	Lamar River, Yellowstone National Park.	L. G. Eakins.	J. P. Iddings, J. G., III, p. 944, 1895.	Shoshonite.	Also in U. S. G. S. Mon. 32, (II), p. 340, 1899. In W. T., p. 269.
15	White Cloud Mine, Silverton, Colorado.	G. Steiger.	F. L. Ransome, U. S. G. S. B. 182, p. 125, 1901.	Andesite breccia.	Altered.
16	White Cloud Mine, Silverton, Colorado.	H. N. Stokes.	F. L. Ransome, U. S. G. S. B. 182, p. 122, 1901.	Latite.	Altered.
17	Engineer Mountain, Silverton, Colorado.	H. N. Stokes.	F. L. Ransome, U. S. G. S. B. 182, p. 122, 1901.	Latite.	
18	King Solomon Mountain, Silverton, Colorado.	Gerhardt and Haldane.	F. R. van Horn, B. G. S. A., XII, p. 8, 1901.	Hornblende andesite.	
19	King Solomon Mountain, Silverton, Colorado.	E. B. Willard.	F. A. van Horn, B. G. S. A., XII, p. 8, 1900.	Hornblende andesite.	
20	Knickerbocker Hill, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17 (II), p. 321, 1896.	Andesite.	Much decom- posed. In W. T., p. 149.
21	Robinson Plateau, Silver Cliff, Colorado.	L. G. Eakins.	W. Cross, U. S. G. S. A. R. 17 (II), p. 321, 1896.	Andesite.	In W. T., p. 163.
22	Idaho Springs, Colorado.	W. T. Schaller.	S. H. Ball, U. S. G. S. P. P. 63, p. 134, 1908.	Biotite latite.	
23	Sugarloaf Mountain, Boulder County, Colorado.	J. C. Blake.	J. C. Blake, Fr. Col. Sc. Soc., VII, p. 12, 1901.	Mica andesite.	
24	South Evans Gulch, Leadville, Colorado.	C. Palmer.	J. D. Irving, U. S. G. S. rec. lab.	Volcanic breccia.	
25	Slumgullion Flow, Lake City quadrangle, Colorado.	W. T. Schaller.	W. Cross, U. S. G. S. B. 419, p. 118, 1900.	Andesite.	
26	Iron Mountain, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 338, p. 49, 1908.	Andesite.	Altered.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
27 A3. III	63.63	15.64	3.59	0.93	2.32	4.46	1.70	5.22	1.70	0.40		0.15		BaO 0.05	99.79	
28 A3. III	63.82	14.28	2.72	0.81	5.98	0.70	3.62	4.24	1.68	2.30		0.04		BaO 0.04	100.23	
29 A3. III	63.76	16.05	1.91	0.58	2.46	4.25	6.26	2.84	0.93	1.22		0.28		BaO none	100.54	
30 A1. I	54.23	17.37	4.00	1.95	3.00	6.67	2.96	2.80	3.71	1.60	0.75	0.34	0.10	CO ₂ 0.33 ZrO ₂ 0.02 SO ₃ none Cl trace FeS ₂ 0.02 Cr ₂ O ₃ none BaO 0.15 SrO 0.06	100.06	
31 A1. I	54.54	14.66	4.20	2.74	3.21	5.64	3.47	5.28	1.87	1.10	0.86	0.49	0.29	CO ₂ 2.19 ZrO ₂ none S 0.01 BaO 0.07 SrO 0.05	100.67	
32 B3. IV	49.80	15.33	n. d.	7.44	6.61	7.19	2.71	4.36	1.38		2.67	0.73	0.30	CO ₂ 2.56	101.08	
33 A1. I	59.76	17.03	5.99	0.90	2.11	4.06	4.50	2.94	0.43	0.64	1.07	0.35	0.10	CO ₂ none SO ₃ none Cl trace BaO 0.14 SrO 0.03	100.05	
34 A2. II	66.44	12.77	1.84	1.35	1.12	3.50	3.78	2.54	2.60	0.20	0.20	0.12		CO ₂ 3.11	99.57	
35 B1. II	59.06	16.24	0.43	4.88	3.51	5.59	2.84	3.95	0.19	0.21	1.08	0.21	0.20	CO ₂ 0.70 BaO 0.11 SrO 0.12	99.32	2.796
36 A2. II	66.64	13.93	0.95	1.46	1.14	2.61	5.66	2.64	3.81	1.19	0.18	0.12			100.33	
37 A3. III	69.51	15.61	0.56	1.27	0.61	2.80	3.43	2.81	3.63		trace				100.23	
38 A1. I	68.75	16.75	0.48	1.72	0.83	0.89	6.95	0.80	1.52	0.84	0.27	0.16	0.04	CO ₂ none BaO 0.03 SrO 0.03	100.06	
39 A2. II	65.40	15.35	2.10	1.22	0.60	1.12	2.07	3.21	7.00	1.18	0.55		0.05	Cl 0.01	100.04	
40 A1. I	91.40	4.31	0.77	0.11	0.18	none	0.06	1.68	0.98	0.46	0.07	0.04	0.06	CO ₂ none ZrO ₂ 0.02 SO ₃ none F trace S none BaO 0.02	100.16	
41 A2. II	76.25	12.84	0.54	0.33	0.56	0.16	0.12	3.20	3.17	2.14	0.37	0.12		CO ₂ none	99.80	
42 A1. I	73.50	14.13	1.51	0.26	0.21	0.12	0.24	5.11	2.81	1.07	0.47	0.09		CO ₂ none SO ₃ 0.17 S 0.03 BaO 0.19	99.91	
43 A2. II	72.98	14.66	1.01	0.16	0.33	0.18	none	6.93	2.95	0.97	0.44	0.16		CO ₂ none	99.87	
44 A1. I	71.14	15.24	1.77	0.26	0.16	0.09	0.24	6.31	2.87	0.85	0.48	0.05		CO ₂ none SO ₃ 0.05 S 0.02 BaO 0.17	99.70	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
27	Desert Mound, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 338, p. 49, 1908.	Andesite.	Weathered.
28	Iron Mountain, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 338, p. 49, 1908.	Andesite.	Altered.
29	Iron Mountain, Iron Springs District, Utah.	R. D. Hall.	Leith and Harder, U. S. G. S. B. 338, p. 49, 1908.	Andesite.	Altered.
30	Ontario Tunnel, Park City quadrangle, Utah.	W. F. Hillebrand.	J. M. Boutwell, U. S. G. S. P. P. 77, p. 74, 1912.	Andesite.	
31	Bonanza Mine, Hillsboro, New Mexico.	G. Steiger.	Lindgren, Graton, and Gordon, U. S. G. S. P. P. 68, p. 43, 1910.	Andesite.	
32	Near Grant's, Mount Taylor region, New Mexico.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 185, 1897.	Mica andesite.	In W. T., p. 419.
33	San Francisco Peak, San Francisco Mountains, Arizona.	H. H. Robinson.	H. H. Robinson, U. S. G. S. P. P. 76, p. 138, 1913.	Latite.	
34	Sloko Lake, Vancouver Island, British Columbia.	M. F. Connor.	D. P. Cairnes, Can. G. S. rec. lab.	Latite tuff.	
35	Record Mountain, Rossland Mountains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (I), p. 327, 1912.	Latite.	
36	John Day Basin, Oregon.	F. C. Calkins.	F. C. Calkins, Un. Cal. Dep. G. B., III, p. 169, 1902.	Andesite ash.	
37	Stillwater Creek, Lassen Peak, California.	W. H. Melville.	J. S. Diller, U. S. G. S. B. 150, p. 212, 1898.	Andesite tuff.	In W. T., p. 419.
38	Spread Eagle Mine, Shasta County, California.	G. Steiger.	B. S. Butler, A. J. S., XXVIII, p. 29, 1909.	Feldspar-epidote rock.	Epidote primary?
39	Cordelia, n. San Francisco, California.	G. E. Colby.	A. C. Lawson, U. S. G. S. Fol. 193, p. 12, 1914.	Andesite tuff.	
40	Mizpah vein, Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 216, 1905.	Andesite.	Extreme stage of alteration.
41	Mizpah vein, Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 216, 1905.	Andesite.	Altered.
42	Mizpah Hill, Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 216, 1905.	Hornblende andesite.	Altered.
43	Mizpah vein, Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 216, 1905.	Andesite.	Altered to quartz and muscovite.
44	Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 216, 1905.	Hornblende andesite.	Kaolinitic alteration.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
45 A1. I	60.45	17.78	5.86	0.25	1.55	1.04	3.58	2.11	2.93	2.86	0.81	0.28		CO ₂ none SO ₃ none FeS ₂ 0.06 BaO 0.07	99.63	
46 A1. I	58.47	16.85	2.04	3.12	3.84	1.35	4.30	3.14	3.59	1.10	0.77	0.35	0.26	Cu ₂ 0.52 SO ₃ none F 0.12 FeS ₂ 0.49 BaO 0.11	100.42	
47 A2. II	57.51	16.55	3.20	2.02	2.30	6.06	2.76	2.81	2.56	1.45	0.80	0.30	0.17	CO ₂ 1.91 SO ₃ none S 0.02	100.42	
48 A1. I	56.26	16.18	5.56	1.17	2.78	5.07	3.25	3.43	2.61	2.07	0.73	0.32	0.21	CO ₂ 0.62 SO ₃ none FeS ₂ 0.03 NiO trace BaO 0.12 SrO 0.06	100.47	
49 A1. I	55.60	16.70	2.23	3.51	2.60	4.27	4.08	3.17	3.06	0.88	0.72	0.28		CO ₂ 2.76 SO ₃ none S none BaO 0.12	99.98	
50 A1. I	51.64	15.58	0.16	0.58	2.79	6.25	0.27	2.46	4.43	2.56	0.73	0.31	0.21	CO ₂ 4.24 ZrO ₂ trace SO ₃ 0.03 FeS ₂ 7.89 NiO none SrO trace	100.13	
51 A1. I	43.00	16.49	2.86	6.31	6.19	5.69	0.12	0.84	7.93	3.00	0.89	0.36		CO ₂ 4.19 SO ₃ 0.08 FeS ₂ 2.55 BaO 0.07 SrO none	100.57	
52 A2. II	61.71	16.63	0.40	—	none	5.94	8.52	0.16	0.81	0.51	0.79	0.15		CO ₂ 4.05 ZrO ₂ 0.04	99.71	
53 A2. II	54.66	17.53	3.18	3.52	3.62	7.33	3.56	2.22	0.69	0.59	0.99	0.30	0.12	CO ₂ 1.35	99.66	
54 A2. II	53.37	16.57	3.84	2.45	5.79	6.30	3.40	2.55	2.33	0.39	0.86	0.29	0.08	CO ₂ 1.61 SrO trace	99.83	
55 A2. II	62.23	14.95	2.04	1.52	0.75	3.10	5.08	1.26	8.94		0.59	0.04		CO ₂ trace C none	100.50	
56 A2. II	60.20	18.89	2.15	1.97	2.49	6.22	4.88	2.05	0.54	0.18	0.38	0.17	0.08		100.20	
57 A3. III	45.31	9.96	3.43	12.99	2.56	16.44	0.41	0.25	3.77					CO ₂ 5.39	100.51	
58 A1. I	61.03	20.93	7.73	1.42	0.16	0.35	2.58	1.76	2.89		0.67	0.08	0.06	CO ₂ 0.09 Cl 0.01 S trace NiO trace BaO 0.33 CuO 0.13	100.22	
59 A3. III	60.09	19.04	3.14	1.89	4.20	2.91	5.26	2.95	0.98						100.46	
60 A2. II	66.99	16.48	1.55	1.26	0.45	4.05	3.81	3.71	0.56			0.13	0.43	CO ₂ 0.29 S 0.08	99.79	2.585
61 A3. III	60.90	16.77	2.78	1.16	1.09	5.28	5.19	3.38	3.15		0.37		trace	X S 0.29 0.57	100.93	2.680
62 A3. III	55.78	12.77	12.65	4.37	6.30	2.88	2.38	0.75	0.83		0.80		trace		99.51	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
45	Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 216, 1905.	Hornblende andesite.	"Relatively fresh."
46	Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 216, 1905.	Hornblende andesite.	"Freshest obtainable."
47	Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 57, 1905.	Pyroxene-biotite andesite.	"Completely decomposed."
48	Tonopah, Nevada.	W. F. Hillebrand.	J. E. Spurr, U. S. G. S. P. P. 42, p. 57, 1905.	Biotite andesite.	Altered.
49	Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 216, 1905.	Hornblende andesite.	Chloritic alteration.
50	Tonopah, Nevada.	W. F. Hillebrand.	J. E. Spurr, U. S. G. S. P. P. 42, p. 241, 1905.	Biotite-pyroxene andesite.	"Entirely altered."
51	Tonopah, Nevada.	G. Steiger.	J. E. Spurr, U. S. G. S. P. P. 42, p. 241, 1905.	Augite-biotite andesite.	Altered.
52	Cottonwood Canyon, Churchill County, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. rec. lab.	Dike rock (andesite?).	
53	Columbia Mountain, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 50, 1909.	Andesite.	
54	Masons Butte, Wabuska, Nevada.	H. N. Stokes.	J. E. Spurr, J. G., IX, p. 593, 1901.	Quartz andesite.	
55	Canal Zone, Panama.	R. C. Wells.	D. F. McDonald, U. S. G. S. rec. lab.	Lava (andesite?)	
56	Chiriqui Mountains, Panama.	W. C. Wheeler.	D. F. McDonald, U. S. G. S. rec. lab.	Volcanic ash (andesite?).	"Recrystal- lized."
57	St. Thomas, West Indies.	J. Siemiradzki.	J. Siemiradzki, N. J., 1886, II, p. 178.	Anorthite andesite.	In W. T., p. 421.
58	Cuyuni River, British Guiana.	J. B. Harrison.	J. B. Harrison, G. Goldf. Br. Gui., p. 62, 1908.	Tuff (andesite?).	
59	Misti Volcano, near Arequipa, Peru.	F. H. Hatch.	F. H. Hatch, T. M. P. M., VII, p. 328, 1886.	Andesite.	"Silicified." In W. T., p. 263.
60	Cerro del Moro, San Luis, Argentina.	E. Kich.	F. Tannhäuser, N. J. B. B., XXII, p. 592, 1906.	Hornblende andesite.	Not fresh.
61	Cerro del Sololasta, San Luis, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 597, 1906.	Hornblende andesite.	
62	Burnt Hill, King Charles Land, Spitzbergen.	N. Sahlbom.	A. Hamberg, G. F. F., XXI, p. 523, 1899.	Hypersthene andesite scoria.	Not fresh. In W. T., p. 423.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
63 A3. III	58.07	17.62	4.97	3.09	1.46	5.23	3.31	2.15	4.15				trace		100.05	
64 A2. II	57.73	16.47	4.42	3.23	1.32	6.16	4.13	2.09	0.82	0.20	0.91	0.63	0.17	CO ₂ 2.47 Cl none S trace NiO trace	100.55	
65 A2. II	49.29	16.66	7.24	4.81	2.42	5.63	4.98	1.86	2.11	0.34	2.27	0.24	0.55	CO ₂ 2.32 Cl trace S none NiO 0.04 BaO trace	100.76	
66 A1. I	50.29	18.11	4.09	8.06	3.32	1.70	5.06	2.65	3.45	0.86	1.67	0.44	0.65	CO ₂ none FeS ₂ 0.06 NiO none BaO none SrO none	100.41	
67 A1. I	50.06	15.72	3.94	7.63	3.82	5.90	4.55	2.16	1.36	0.67	2.46	0.64	0.30	CO ₂ 1.08 Cl 0.04 S none NiO 0.03 BaO 0.03 Li ₂ O none	100.39	
68 A4. IV	56.10	17.24	4.76	n. d.	2.29	11.20	2.04	1.38	1.55					CO ₂ 3.60	100.16	
69 A3. III	64.00	15.00	n. d.	3.24	2.17	4.17	5.10	1.49	0.60	0.64	0.06			CO ₂ 3.30	100.5	
70 A3. III	59.32	19.10	1.90	3.69	5.90	0.60	2.19	2.46	4.85						100.01	
71 A2. II	60.19	14.47	2.53	0.78	4.45	3.80	7.53	0.88	3.16	1.14	0.50	0.07	0.06	CO ₂ 0.38 S trace BaO trace	99.94	
72 B2. III	64.48	14.58	4.60	0.93	1.13	4.00	3.60	0.99	2.02		3.07	0.58	0.20	CO ₂ 0.94 F 0.05	101.17	2.593
73 A2. II	63.10	14.26	5.73	1.06	1.05	3.70	3.85	1.09	1.31		3.46	0.57	0.21	CO ₂ 0.46 F 0.05	99.90	2.446
74 A2. II	62.78	14.69	5.30	1.06	1.07	3.84	3.78	1.13	1.78		3.10	0.58	0.25	CO ₂ 0.54 F 0.05	99.95	2.445
75 A2. II	61.69	15.23	4.97	0.89	1.03	5.41	3.75	1.04	1.10		3.69	0.51	0.27	CO ₂ 0.52 F 0.05	100.05	2.522
76 A2. II	58.53	19.87	2.20	1.10	1.02	1.33	6.51	4.85	3.28	0.46	0.51	0.16		CO ₂ 0.13 SO ₃ 0.10	100.05	
77 A3. III	61.70	16.36	2.29	2.75	1.94	2.65	5.05	3.05	2.45				trace	CO ₂ 1.63	99.87	
78 A2. II	52.76	18.22	3.13	2.64	1.95	5.97	3.60	3.84	5.54		1.79	1.64			100.08	
79 A3. III	52.02	19.34	5.01	4.08	3.32	9.13	2.61	0.84	2.58	1.15					100.08	
80 B2. III	58.57	16.81	2.96	4.46	2.15	7.70	3.16	1.24	1.55	0.53	0.24	0.13	trace	CO ₂ 1.57	101.07	2.81
81 B3. IV	62.02	15.15	2.08	1.96	3.15	5.52	3.18	1.66	4.57						99.29	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
63	Beinn More, Mull, Scotland.	G. H. Perry.	J. W. Judd, Q. J. G. S., XLVI, p. 349, 1890.	Propylite.	Altered. In W. T., p. 241.
64	Blackford Hill, Pentland Hills, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot. Mem. Sh. 32, p. 34, 1910.	Andesite.	
65	Corston Hill, Mid-Lothian, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot. Mem. Sh. 32, p. 323, 1910.	Mugearite.	
66	Cairn on Lairs, Lennoxtown, n. Glasgow, Scotland.	E. G. Radley.	G. W. Tyrrell, G. S. Scot. Mem. Sh. 30, p. 142, 1911.	Mugearite.	
67	Balhennan, n. Stirling, Scotland.	E. G. Radley.	G. W. Tyrrell, G. S. Scot. Mem. Sh. 30, p. 142, 1911.	Mugearite.	Also in Q. J. G. S., LXVII, p. 202, 1911.
68	Cockfield-Armathwaite Dike, Preston, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 224, 1884.	Andesite.	In W. T., p. 423.
69	Chateau de Panard, Brittany.	Pisani.	L. Vandernotte, Mass. Armor., p. 135, 1913.	Andesite.	
70	St. Hilaire, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Andesite porphyry.	
71	Vattenviken, n. Ulfön, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 165, 1913.	Salic dike rock (andesite?).	
72	Froschberg, Siebengebirge, Rheinland.	Von Reiss.	W. Hocks, Jb. Pr. G. L.-A., XII, p. 16, 1893.	Andesite.	In W. T., p. 241.
73	Froschberg, Siebengebirge, Rheinland.	Von Reiss.	W. Hocks, Jb. Pr. G. L.-A., XII, p. 16, 1893.	Andesite.	In W. T., p. 241.
74	Froschberg, Siebengebirge, Rheinland.	Von Reiss.	W. Hocks, Jb. Pr. G. L.-A., XII, p. 16, 1893.	Andesite.	In W. T., p. 241.
75	Froschberg, Siebengebirge, Rheinland.	Von Reiss.	W. Hocks, Jb. Pr. G. L.-A., XII, p. 16, 1893.	Andesite.	In W. T., p. 241.
76	Annerod, Hesse.	Survey laboratory.	W. Schottler, Erl. G. Kt. Hes., Bl. Giessen, p. 100, 1913.	Pumice sand (andesite?).	
77	Schneidchen, Erdesbach, Pfalz, Bavaria.	A. Schwager.	Schuster and Schwager, Geog. Jhft., XXIII, p. 54, 1910.	Cuselite.	
78	Buchau, n. Karlsbad, Bohemia.	A. Krehan.	A. Krehan, Jb. G. R.-A. Wien., LXII, p. 36, 1912.	Trachyandesite.	
79	Balazsfalva, Siebenbürgen, Hungary.	S. Ferenczi.	J. v. Szadeczky, Muz. Füzt., I, p. 181, 1912.	Andesite tuff.	
80	Bolijevici, Montenegro.	E. Manasse.	E. Manasse, Pr. Soc. Tosc., XIII, p. 171, 1903.	Hornblende andesite.	
81	Dubowka, Mariupol, Russia.	J. Morozewicz.	J. Morozewicz, Ref. N. J., 1900, I, p. 394.	Hornblende andesite.	

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
82 A1. I	60.27	18.07	4.90	1.20	1.43	3.88	4.71	3.08	1.58		0.31	0.16	0.20	CO ₂ 0.79 Cl 0.02 S 0.02 BaO 0.03 SrO trace	100.65	2.704
83 A2. II	49.70	13.24	8.60	4.05	3.21	6.31	5.28	1.90	4.00		3.35	0.26			99.90	
84 A3. III	59.27	17.06	2.16	2.61	1.52	3.37	2.49	3.63	6.42	1.34	0.83		trace		100.70	
85 A3. III	57.26	16.95	7.55	n. d.	1.10	3.56	1.64	1.86	7.65	1.43	0.91		0.23		100.14	
86 A3. III	56.84	18.46	1.75	2.51	1.59	4.78	4.12	2.72	6.95	1.76			trace		100.48	
87 A4. IV	53.63	19.59	5.70	n. d.	3.35	3.53	3.64	1.62	7.91		0.96				99.93	
88 A2. II	59.47	16.97	2.80	3.69	2.82	5.83	2.40	2.36	2.27	0.65	0.77	trace			100.03	
89 A3. III	58.39	15.90	6.88	1.73	3.35	7.76	0.89	4.17	0.32				0.90		100.29	2.755
90 A2. II	54.33	16.96	3.86	3.72	3.11	5.81	2.05	1.67	4.27	0.87	0.72	0.23		CO ₂ 2.31 S 0.07	99.98	
91 A2. II	15.43	38.57	14.82	1.89	0.41	0.19	0.78	0.08	21.65	2.63	1.87	0.36	0.22	CO ₂ 0.52 SO ₃ none Cl trace S none	99.36	
92 A2. II	16.82	34.75	19.17	n. d.	0.80	0.44	0.26	0.40	20.74	2.11	3.98	0.23	0.15		99.84	
93 A1. I	54.24	15.41	2.34	5.92	3.31	4.84	3.34	2.62	1.67	0.72	1.57	trace	trace	CO ₂ 4.44 ZrO ₃ trace Cl 0.01 S 0.24 Cr ₂ O ₃ none NiO 0.05 BaO none SrO none	100.67	2.625
94 A1. I	52.16	17.61	2.55	4.75	2.88	5.85	4.25	2.69	2.75	0.35	0.76	0.39	0.29	CO ₂ 2.89 ZrO ₃ none SO ₃ 0.22 Cl 0.04 S 0.15 Cr ₂ O ₃ none V ₂ O ₅ trace NiO none BaO 0.08 SrO trace CuO none	100.66	2.667
95 A2. II	54.41	12.80	0.16	10.35	5.72	5.21	3.02	0.02	3.42	0.15	0.78		0.09	CO ₂ 3.58	99.71	
96 A1. I	45.52	10.87	0.84	7.92	11.72	6.80	2.24	0.04	3.32	0.06	0.43	0.45	0.32	CO ₂ 9.52 ZrO ₃ 0.01 FeS ₂ 0.17 Cr ₂ O ₃ 0.08 V ₂ O ₅ 0.30 BaO none	100.61	2.82
97 A1. I	43.13	12.16	1.54	10.64	4.79	8.71	1.70	0.48	2.59	0.12	1.22	0.88	0.60	CO ₂ 11.56 ZrO ₃ none FeS ₂ 0.39 Cr ₂ O ₃ none V ₂ O ₅ 0.04 BaO none	100.54	2.93
98 A3. III	66.20	20.51	0.84	1.12	0.72	0.95	0.90	3.10	5.50		0.21			CO ₂ 0.10	100.15	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
82	Jelowaya River, Jenissei District, Siberia.	E. Collett.	J. Rakovski, Tr. Mus. Pet. Gr., V., p. 227, 1911.	Trachyandesite.	Not fresh.
83	Wou-lou-si-chou, Yun-nan, China.	Pisani.	J. Deprat, Mem. Sv. Ct. Ind. Ch., I (1), p. 23, 1912.	Andesite.	
84	Guadalupe, near Manila, Luzon, Philippine Islands.	A. J. Cox.	A. J. Cox, Phil. J. Sci. (A), III, p. 404, 1908.	Tuff.	
85	Majayjay, near Manila, Luzon, Philippine Islands.	A. J. Cox.	A. J. Cox, Phil. J. Sci. (A), III, p. 404, 1908.	Tuff.	
86	Manila, Luzon, Philippine Islands.	A. J. Cox.	A. J. Cox, Phil. J. Sci. (A), III, p. 404, 1908.	Tuff.	
87	Saleijer Island, Celebes.	A. Wichmann.	A. Wichmann, Nk. Tds. Ned. Ind., LIV, p. 261, 1895.	Andesite tuff.	In W. T., p. 429.
88	Kuta-Baju Pass, Timorland, Sumatra.	M. Dittrich.	H. Stegman, N. J. B. B., XXVII, p. 432, 1909.	Hornblende andesite.	Altered.
89	Sago Volcano, Sumatra.	J. G. Kramers.	R. D. M. Verbeek, Sum. Westk., p. 518, 1883.	Augite andesite.	Not in W. T.
90	Parsambilan, Tobaland, Sumatra.	M. Dittrich.	H. Stegmann, N. J. B. B., XXVII, p. 424, 1909.	Andesite.	
91	Burangerang, Preanger Province, Java.	E. G. J. Mohr.	E. G. J. Mohr, B. Dep. Agric. Indes Neerl., XXVIII, p. 10, 1909.	Laterite.	From andesite.
92	Gapit River, Sumbawa Island.	A. Lindner.	G. Rack, N. J. B. B., XXXIV, p. 65, 1912.	Andesite laterite.	
93	Eumundi, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 169, 1906.	Andesite.	
94	Good Dog Mountain, Cambewarra Range, New South Wales.	H. P. White.	Card and Jaquet, Rec. G. S. N. S. W., VII, p. 132, 1902.	Andesite.	Average of 9 specimens.
95	North Pole, Pilbara, Western Australia.	C. C. Williams.	A. G. Maitland, G. S. W. Aust., B. 15, p. 12, 1904.	Andesite.	
96	Kalgoorlie, Western Australia.	H. Bowley.	Simpson and Gibson, W. Aust. G. S. B. 42, p. 61, 1912.	Propylite.	
97	Boulder, Kalgoorlie, Western Australia.	H. Bowley.	Simpson and Gibson, W. Aust. G. S. B. 42, p. 61, 1912.	Propylite.	
98	Tokotea Hill, Coromandel, Hauraki, New Zealand.	J. S. MacLaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 44, 1907.	Tuff.	

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
99 A3. III	65.25	20.32	1.73	n. d.	1.20	none	1.06	3.90	3.78		0.50		0.05	FeS ₂ 2.21	100.00	
100 A2. II	58.40	19.11	5.76	1.22	2.84	2.95	2.80	2.59	1.76		0.72		0.29	CO ₂ 1.84	100.28	
101 A2. II	57.72	22.49	0.96	4.82	2.34	1.05	1.18	3.87	4.80		0.66		0.21	CO ₂ 0.05	100.25	
102 A2. II	60.75	18.34	0.40	5.76	2.03	2.60	1.69	2.92	3.30		0.51		0.42	CO ₂ 1.50	100.22	
103 A3. III	60.40	17.84	6.40	n. d.	0.13	4.30	2.46	1.15	7.00		0.41		0.05	CO ₂ 0.30	100.44	
104 A2. II	57.32	16.56	9.28	0.25	0.12	6.05	2.38	1.52	2.50		0.48		0.25	CO ₂ 3.20 SO ₂ none	99.66	
105 A2. II	57.25	16.39	0.40	7.35	3.55	4.50	2.37	1.97	3.25		0.92		0.36	CO ₂ 1.38	99.69	
106 A2. II	55.58	17.27	1.12	7.41	4.85	7.30	1.50	0.46	2.05		0.67		0.40	CO ₂ 1.45	100.06	
107 A2. II	53.28	17.54	1.20	7.92	5.26	7.70	2.01	0.26	2.08		0.61		0.78	CO ₂ 1.24	99.88	
108 A2. II	48.90	17.67	1.20	7.06	3.91	11.00	1.89	0.34	2.28		0.98		0.19	CO ₂ 4.87	100.29	
109 A2. II	68.12	19.64	0.56	0.50	0.12	0.38	0.57	0.53	8.60		0.98		none		100.00	
110 A2. II	55.61	18.46	0.96	5.62	3.24	7.20	1.17	2.78	1.63		0.74		0.15	CO ₂ 2.18	99.74	
111 A2. II	57.42	17.61	2.34	3.77	2.19	5.69	3.22	1.94	2.62	0.85	0.68	0.31	0.43	CO ₂ 0.95	100.02	
112 A2. II	52.69	18.33	2.32	2.98	3.09	7.87	2.62	0.98	3.71	0.73	0.53	0.42	0.25	CO ₂ 3.59	100.11	
113 A2. II	61.83	16.68	1.52	1.44	2.40	5.05	3.12	1.78	2.43	2.77	0.56	0.16	0.04		99.78	
114 A2. II	61.20	17.61	4.35	1.33	1.21	4.48	3.21	1.74	2.69	1.38	0.85	0.10	0.05	CO ₂ none	100.20	
115 A2. II	54.10	17.95	2.56	4.25	1.85	9.43	2.01	1.54	5.38		0.78		0.15		100.00	
116 A2. II	52.60	18.08	2.88	5.11	4.24	9.30	2.06	1.80	1.18		0.66		0.23	CO ₂ 2.25	100.39	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
99	Tokatea Hill, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	C. Fraser, G. S. N. Z. B. 10, p. 21, 1910.	Felsite.	Altered.
100	Tokotea Saddle, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 44, 1907.	Tuff.	
101	Tokotea Hill, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 44, 1907.	Tuff.	
102	Tiki Creek, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 44, 1907.	Tuff.	
103	Raffin Peninsula, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 82, 1907.	Andesite.	
104	Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 93, 1907.	Andesite.	
105	Waikoromiko Creek, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 73, 1907.	Andesite.	
106	Waikoromiki, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 70, 1907.	Hypersthene andesite.	
107	Opitonui, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 71, 1907.	Augite andesite.	
108	Whangarahi Creek, Coromandel, Hauraki, New Zealand.	J. S. Maclaurin.	Fraser and Adams, G. S. N. Z. B. 4, p. 74, 1907.	Andesite.	Altered.
109	Thames, Hauraki, New Zealand.	J. S. Maclaurin.	C. Fraser, G. S. N. Z. B. 10, p. 24, 1910.	Pyroxene andesite.	Altered and leached. Cf. No. 89, II.4.4.4-5.
110	Waihi, Hauraki, New Zealand.	Survey laboratory.	Bell and Fraser, G. S. N. Z. B. 15, p. 45, 1912.	Andesite.	
111	Thames, Hauraki, New Zealand.	(?)	Cited by A. M. Finlayson, Ec. G., IV, p. 637, 1909.	Hornblende andesite.	
112	Thames, Hauraki, New Zealand.	(?)	Cited by A. M. Finlayson, Ec. G., IV, p. 637, 1909.	Hornblende andesite.	Altered.
113	Aroha, Hauraki, New Zealand.	Survey laboratory.	Henderson and Bartrum, G. S. N. Z. B. 16, p. 62, 1913.	Andesite.	
114	Wairoa River, Aroha, Hauraki, New Zealand.	Survey laboratory.	Henderson and Bartrum, G. S. N. Z. B. 16, p. 62, 1913.	Andesite.	
115	Tararu Creek, Hauraki, New Zealand.	J. S. Maclaurin.	C. Fraser, G. S. N. Z. B. 10, p. 24, 1910.	Hornblende andesite.	Altered.
116	Karaka Mine, Hauraki, New Zealand.	J. S. Maclaurin.	C. Fraser, G. S. N. Z. B. 10, p. 24, 1910.	Pyroxene andesite.	

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
117 A2. II	54.90	18.23	0.74	3.70	4.20	3.42	2.92	2.19	3.44		0.57		0.18	CO ₂ 1.93 FeS ₂ 3.88	100.30	
118 A2. II	49.48	18.00	3.91	3.30	6.48	9.75	2.55	0.66	5.25		0.79	0.17			100.32	
119 A2. II	48.22	18.47	5.28	3.90	2.07	6.02	4.94	3.47	2.89	0.44	2.09	0.88	0.10	CO ₂ 1.23	100.00	

LAMPROPHYRES.

1 A2. II	50.03	14.08	2.92	6.11	10.73	7.46	1.46	2.64	3.70		0.61	0.42	0.08	Cr ₂ O ₃ trace NiO trace BaO 0.04	100.28	
2 A1. I	50.76	12.20	1.19	6.65	11.75	6.26	2.16	4.79	0.66	0.22	0.76	0.28	0.30	CO ₂ 1.39 Cl none FeS ₂ 0.18 Cr ₂ O ₃ 0.10 V ₂ O ₅ 0.03 NiO 0.06 BaO 0.04	99.78	
3 A2. II	50.15	16.10	2.65	5.58	8.38	8.61	2.35	1.36	3.90		1.70	0.13			100.91 (100.78)	
4 A1. I	53.62	12.10	2.00	6.30	7.07	11.64	1.84	1.52	1.86	0.22	0.50	0.29	0.17	CO ₂ 1.12 SO ₃ 0.02 Cl trace V ₂ O ₅ 0.02 NiO trace BaO 0.04 SrO trace	100.33	2.892
5 A1. I	50.05	19.56	0.90	6.48	6.30	5.20	2.49	3.09	3.90	0.43	0.55	0.38	0.09	CO ₂ 0.32 ZrO ₂ none SO ₃ 0.03 Cl trace Cr ₂ O ₃ none V ₂ O ₅ 0.05 NiO trace BaO 0.15 SrO trace	99.97	2.775
6 A1. I	45.88	13.22	3.20	5.31	12.05	8.18	1.62	2.07	2.80	2.24	0.72	0.35	0.15	CO ₂ 1.36 ZrO ₂ none SO ₃ 0.49 Cl none S none Cr ₂ O ₃ 0.04 V ₂ O ₅ 0.02 NiO 0.05 BaO 0.15 SrO trace Sb ₂ O ₃ 0.03	99.93	2.800
7 A3. III	55.39	11.90	0.90	4.71	3.67	7.63	1.99	4.30	6.08	0.26	1.26			CO ₂ 2.12	100.19	
8 A2. II	46.11	14.75	2.20	4.51	5.73	7.82	1.29	3.84	2.90		0.84		trace	CO ₂ 7.32 S 1.37 X 0.97	99.65	2.904
9 A3. III	40.71	19.46	7.46	6.83	6.21	11.83	1.80	3.26	1.53				0.18	CO ₂ 0.74	100.01	
10 A1. I	32.32	8.16	9.46	4.10	5.97	12.60	0.69	5.97	4.09	1.03	4.55	3.78	0.13	CO ₂ 6.30 S 0.26 BaO 0.36 SrO 0.24	100.01	
11 A1. I	49.59	15.30	5.01	4.19	4.50	5.51	2.24	3.80	3.59	2.98	1.50	0.94	0.11	CO ₂ none ZrO ₂ 0.05 S 0.09 BaO 0.21 SrO 0.12	99.73	
12 A1. I	48.33	12.56	1.87	5.26	9.07	8.94	1.81	4.67	2.63	0.97	0.81	0.78	0.13	CO ₂ 2.64 BaO 0.24 SrO 0.05	100.76	2.771

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
117	Talisman Mine, Aroha, Hauraki, New Zealand.	Survey laboratory.	Henderson and Bartrum, G. S. N. Z. B. 16, p. 62, 1913.	Andesite tuff.	
118	Jenny Island, Weddell quadrant, Antarctica.	Lassieur.	E. Gourdon, pers. com.	Andesite.	
119	Northern Foothills, S. Victoria Land, Antarctica.	G. T. Prior.	G. T. Prior, Nat. Ant. Exp., I, p. 132, 1907.	Banakite.	"CO ₂ includes loss."

LAMPROPHYRES.

1	South Boulder Creek, Montana.	L. G. Eakins.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 670, 1895.	Lamprophyre.	In W. T., p. 329.
2	Garbh Alt, Glen Calvie, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem. Sh. 93, p. 125, 1912.	Lamprophyre schist.	
3	Courzieu, Lyonnais, France.	Pisani.	A. Michel-Levy, C. R., CLVI, p. 718, 1913.	Hornblende lamprophyre.	
4	Caves House, Jenolan, New South Wales.	W. G. Stone	G. W. Card, pers. com.	Lamprophyre.	
5	Caves House, Jenolan, New South Wales.	W. G. Stone.	G. W. Card, pers. com.	Lamprophyre.	
6	Hillgrove, New England, New South Wales.	J. C. H. Mingaye.	E. C. Andrews, Rec. G. S. N. S. W., VIII (3), p. 228, 1907.	Hornblende lamprophyre.	
7	Lake Dufresnoy, Kewagama Lake, Quebec.	S. J. Lloyd.	M. E. Wilson, Can. G. S. Mem. 39, p. 50, 1913.	Minette.	
8	Hulls cove, Conanicut Island, Rhode Island.	L. V. Pirsson.	L. V. Pirsson, A. J. S., XLVI, p. 375, 1893.	Minette.	In W. T., p. 397.
9	Franklin Furnace, Sussex County, New Jersey.	L. G. Eakins.	J. P. Iddings, U. S. G. S. B. 150, p. 238, 1898.	Minette.	In W. T., p. 397.
10	Apishapa Canyon, Colorado.	G. Steiger.	W. Cross, U. S. G. S. P. P. 90, p. 19, 1914.	Minette.	
11	Cerbat District, Mohave County, Arizona.	G. Steiger.	F. C. Schrader, U. S. G. S. B. 397, p. 33, 1909.	Minette.	
12	Dewdney Trail, Nelson Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (I), p. 311, 1912.	Olivine augite minette.	

LAMPROPHYRES—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13 A1. I	41.57	9.75	4.06	4.47	8.65	11.10	1.57	6.10	2.30	1.54	2.36	4.05	0.25	CO ₂ 1.24 ZrO ₂ 0.02 Cl 0.04 F 0.23 FeS ₂ 0.06 Cr ₂ O ₃ 0.04 V ₂ O ₅ 0.04 NiO 0.02 BaO 0.44 SrO 0.11 Li ₂ O trace	100.01	
14 A1. I	49.14	14.89	1.08	3.88	7.07	5.13	2.74	5.82	1.16	0.15	1.81	1.49	0.14	CO ₂ 4.94 Cl 0.05 F 0.20 FeS ₂ 0.32 BaO 0.49 SrO none	100.50	
15 A2. II	52.18	12.85	0.77	4.95	7.64	4.71	1.93	5.29	1.73		1.85	0.03		CO ₂ 5.68	99.61	
16 A2. II	47.77	14.75	1.17	6.43	6.72	5.62	2.59	4.28	2.44		2.10	0.05		CO ₂ 5.54	99.46	
17 A2. II	51.22	17.56	3.51	4.34	3.22	4.52	5.72	4.37	1.93		1.70	1.08	0.20	CO ₂ 0.60	99.97	
18 A3. III	49.24	11.47	1.10	8.34	9.87	5.76	2.67	5.75	3.41		0.74			CO ₂ 1.56	99.91	
19 A2. II	50.81	15.13	2.40	3.52	10.64	4.96	1.01	7.01	3.07		1.71	0.62	trace	CO ₂ trace Cl trace	100.88	
20 A2. II	51.12	7.25	7.79	2.06	10.61	7.25	2.48	3.62	3.00	3.14	1.52		0.21		100.05	
21 A1. I	52.06	13.36	1.26	5.24	6.75	6.73	1.38	6.03	0.98	0.14	2.08	0.91	0.11	CO ₂ 2.20 FeS ₂ 0.17 Cr ₂ O ₃ trace BaO 0.12 SrO trace	99.52	
22 A2. II	45.15	15.39	2.76	5.64	6.38	8.83	2.67	2.77	2.85		2.80	0.56	0.14	CO ₂ 4.27	100.21	2.70
23 A1. I	47.31	16.21	5.11	2.90	3.08	7.11	3.92	3.73	2.17	0.87	1.64	0.90	trace	CO ₂ 4.98 ZrO ₂ 0.01 SO ₂ 0.05 Cl 0.05 S 0.06 BaO 0.17 SrO 0.02	100.29	
24 A1. I	44.31	14.10	4.75	6.02	7.80	9.66	3.74	2.83	3.29	0.88	2.10	0.53	0.18	CO ₂ none S 0.10 BaO 0.10 SrO 0.10	100.49	
25 A2. II	53.12	14.94	5.06	3.18	4.79	7.07	3.73	2.00	3.18		0.85	0.47	trace	CO ₂ 1.67 S trace	100.06	2.85
26 A2. II	57.50	18.23	none	5.81	3.80	5.45	3.15	1.73	1.48	0.12	0.92	0.30	0.10	CO ₂ 0.50 FeS ₂ 1.12	100.21	
27 A2. II	48.73	11.92	4.79	4.56	5.93	9.24	2.62	2.47	1.52		1.34	0.32	0.36	CO ₂ 5.80 SO ₂ 0.34 Cl 0.11 BaO trace	100.05	
28 A2. II	47.42	15.65	2.66	4.05	4.90	8.56	2.60	4.10	2.60	0.30	0.70	0.54	0.10	CO ₂ 6.24 BaO 0.14 SrO 0.10	100.66	2.740
29 A3. III	58.20	19.20	1.10	3.52	2.01	3.67	3.60	4.55	1.40					CO ₂ 2.40	99.65	
30 A2. II	54.81	17.80	2.69	4.46	5.03	1.78	4.06	3.86	3.56		0.75	0.45		CO ₂ 0.44 SO ₂ trace	99.69	2.712

LAMPROPHYRES—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	Northport, Columbia River, Washington.	W. F. Hillebrand.	F. L. Ransome, A. J. S., XXXVI, p. 338, 1908.	Apatitic minette.	
14	St. Mabyn Church, Cornwall, England.	E. G. Radley.	C. Reid, G. S. Eng., sh. 335, p. 62, 1910.	Minette.	
15	Taillefer, near Pelvoux, France.	Lassieur.	P. Termier, B. Soc. M. Fr., XXXIV, p. 42, 1911.	Minette.	
16	Taillefer, near Pelvoux, France.	Lassieur.	P. Termier, B. Soc. M. Fr., XXXIV, p. 42, 1911.	Minette.	
17	Brathagen, Lougendal, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 130, 1899.	Soda minette.	In W. T., p. 263.
18	Weinheim, Baden?	Z. Weyberg.	Z. Weyberg, Ref. N. J., 1912, I, p. 398.	Minette.	
19	Plauensche Grund, Dresden, Saxony.	B. Doss.	B. Doss, T. M. P. M., XI, p. 27, 1890.	Augite minette.	In W. T., p. 265.
20	Zampachen, near Eule, Böhmische Mittelgebirge.	J. Friedrichsen.	V. Rosicky, Sb. Bohm. Ges. W., 1901, Art. XXX, p. 29.	Minette.	
21	Willow Tree Creek, Atunga, New South Wales.	W. N. Benson.	W. N. Benson, Fr. Linn. Soc. N. S. W., XXXVIII, p. 706, 1914.	Minette.	
22	Fourmile Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 112, 1896.	Augite vogesite.	In W. T., p. 317.
23	Jennie Sample Mine, Cripple Creek, Colorado.	W. T. Schaller.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 95, 1906.	Vogesite.	
24	Dripping Stone, Apishapa quadrangle, Colorado.	G. Steiger.	W. Cross, U. S. G. S. P. P. 90, p. 19, 1914.	Augite vogesite.	
25	Sining Fu, W. Kansu, China.	C. Pfeil.	K. Futterer, Durch Asien, III (4), p. 23, 1911.	Vogesite.	
26	Waitahu, Reefton District, New Zealand.	Henderson.	P. G. Morgan, pers. com.	Mica vogesite.	
27	Bighorn Pass, Yellowstone National Park.	J. E. Whitfield.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 70, 1899.	Kersantite.	In W. T., p. 317.
28	Salmon River, Nelson Range, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38, (I), p. 313, 1912.	Kersantite.	
29	Hopital Camfront, Brittany, France.	Not stated.	C. Barrois, Cong. G. Int., VIII, Guide VII, p. 19, 1900.	Kersantite.	In W. T., p. 269.
30	Unterneubrunn, Thüringerwald, Thuringia.	W. Hampe.	H. Loretz, Jb. Pr. G. L.-A. (1887), p. 105, 1888.	Kersantite.	In W. T., p. 259.

LAMPROPHYRES—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
31 A2. II	52.25	14.93	3.50	3.70	5.84	6.33	2.86	3.76	2.68		0.62	0.62		CO ₂ 2.62 SO ₃ 0.21	99.92	2.725
32 A2. II	52.12	13.52	2.56	4.53	6.36	5.78	2.34	5.36	1.86		1.20	0.92		CO ₂ 3.59 SO ₃ 0.22	100.36	2.726
33 B3. IV	52.68	14.05	4.87	7.88	6.58	1.75	2.79	2.30	6.07		0.40	trace	trace	S trace	99.33	2.77
34 A3. III	49.16	14.17	4.62	6.60	7.01	6.45	4.61	2.23	4.22		0.42	trace	trace		99.49	2.72
35 A4. IV	49.82	14.50	8.06	n. d.	5.81	7.69	3.03	3.50	2.54			trace	trace	CO ₂ 4.42	99.57	
36 A4. IV	45.14	9.68	13.55	n. d.	10.78	8.65	2.02	3.27	4.24			trace	trace	CO ₂ 2.82 S trace	100.15	
37 A3. III	51.80	16.65	4.93	2.14	6.90	7.35	3.68	4.05	1.32				0.29	CO ₂ 0.50	99.61	
38 A2. II	54.36	14.71	1.89	6.11	7.92	2.42	1.18	4.62	4.05		0.96	0.52		CO ₂ 0.47 SO ₃ 0.38 C 0.05	99.64	2.755
39 A2. II	49.20	13.56	4.91	5.01	6.84	7.85	2.63	3.90	1.90		1.15	0.71	0.14	CO ₂ 1.50	100.62	
40 A2. II	45.48	11.89	1.78	6.29	13.27	9.42	2.14	2.84	2.72		0.52	0.79	0.08	CO ₂ 0.79	99.57	
41 A2. II	56.18	15.51	2.86	3.94	5.46	3.69	4.07	3.21	3.19		0.45	0.31		CO ₂ 0.95 SO ₃ trace	99.82	2.708
42 A3. III	44.66	14.84	4.46	9.49	7.17	6.87	2.95	1.69	3.61		0.10		trace	CO ₂ 3.77	99.61	3.222
43 A2. II	52.83	12.40	3.17	4.02	6.42	5.64	2.22	6.18	4.18		0.69		0.05	CO ₂ 2.34	100.14	
44 A2. II	36.42	10.06	2.56	6.89	13.69	14.41	3.09	1.54	1.48	0.95	1.56	0.71		CO ₂ 4.08 FeS ₂ 3.32	100.76	
45 A3. III	53.28	16.03	1.93	5.88	8.66	2.84	4.73	1.92	4.92						100.19	2.70
46 A1. I	45.51	13.84	1.90	7.59	3.85	8.33	5.09	1.88	1.67	0.16	3.84	0.61	0.40	CO ₂ 2.23 SO ₃ 0.60 Cl 0.05 BaO 0.12	99.69	
47 A1. I	43.36	14.52	1.43	6.13	7.12	10.53	3.35	1.33	1.28	0.32	3.00	0.24	0.15	CO ₂ 0.64 SO ₂ 0.25 Cl 0.10 FeS ₂ 0.47 Fe ₂ S ₃ 5.90 BaO 0.01 SrO 0.01	99.84	
48 A3. III	40.95	16.45	13.47	n. d.	6.10	10.53	4.00	1.28	3.84		3.39	0.29	0.33		100.63	
49 A3. III	45.20	17.12	5.98	6.55	5.29	7.89	4.23	2.31	5.35		0.68				100.60	

LAMPROPHYRES—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
31	Querbachthal, Thuringorwald, Thuringia.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L.-A. (1887), p. 112, 1888.	Kersantite.	In W. T., p. 271.
32	Unterneubrunn, Thuringerwald, Thuringia.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L.-A. (1887), p. 105, 1888.	Kersantite.	In W. T., p. 259.
33	Bärenstein, Thuringia.	R. Pöhlmann.	R. Pöhlmann, N. J. B. B., III, p. 100, 1885.	Kersantite.	Border of dike. In W. T., p. 413.
34	Bärenstein, Thuringia.	R. Pöhlmann.	R. Pöhlmann, N. J. B. B., III, p. 97, 1885.	Kersantite.	In W. T., p. 315.
35	Falkenstein, Thuringia.	R. Pöhlmann.	R. Pöhlmann, N. J. B. B., III, p. 97, 1885.	Kersantite.	In W. T., p. 413.
36	Göhren, Thuringia.	R. Pöhlmann.	R. Pöhlmann, N. J. B. B., III, p. 97, 1885.	Kersantite.	In W. T., p. 413.
37	Stengerts, Shessart, Bavaria.	H. Stuber.	E. Goller, N. J. B. B., VI, p. 566, 1889.	Kersantite.	In W. T., p. 271.
38	Michaelstein, Harz.	F. Steffen.	M. Koch, Jb. Pr. G. L.-A. (1886), p. 68, 1887.	Kersantite.	In W. T., p. 227.
39	Oberlichtenau, Lausitz.	P. J. Beger.	P. J. Beger, Vh. Sachs. Ges. W., LXV, p. 376, 1913.	Kersantite.	
40	Oberlichtenau, Lausitz.	P. J. Beger.	P. J. Beger, Vh. Sachs. Ges. W., LXV, p. 376, 1913.	Kersantite.	
41	Wüstewaltersdorf, Silesia.	A. Steffen.	E. Dathe, Z. D. G. G., XXXVII, p. 1035, 1885.	Kersantite.	In W. T., p. 265.
42	Abendweide, Rieserferner, Tyrol.	F. Erben.	F. Becke, Ds. Ak. W. Wien, LXXV, p. 160, 1913.	Kersantite.	
43	Wielischthal, Tatra Mountains, Hungary.	Z. Weyberg.	Z. Weyberg, Ref. N. J., I, p. 398, 1912.	Kersantite.	
44	Val Flesch, n. Pizzo Formico, Lombardy.	E. Artini.	E. Artini, At. Soc. It. Mil., XLIII, p. 29, 1904.	Augite kersantite.	
45	Tschurnukan, Uda Bay, East Siberia.	Not stated.	K. E. Bogdanoritch Fund. Marek., p. 56.	Kersantite.	
46	Montreal, Quebec.	B. J. Harrington.	F. D. Adams, Cong. G. Int., XII, Guide III, p. 46, 1913.	Camptonite.	
47	Mount Royal, Montreal, Quebec.	M. F. Connor.	F. D. Adams, Cong. G. Int., XII, Guide III, p. 46, 1913.	Camptonite.	
48	Montreal, Quebec.	B. J. Harrington.	F. D. Adams, Cong. G. Int., XII, Guide III, p. 46, 1913.	Camptonite.	"H ₂ O mostly CO ₂ ."
49	Portland Head Light, Portland, Maine.	E. C. E. Lord.	E. C. E. Lord, Am. G., XXII, p. 344, 1898.	Camptonite.	In W. T., p. 301.

LAMPROPHYRES—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
50 A2. II	42.73	14.50	4.03	7.28	5.46	8.46	3.11	2.28	3.08	0.36	4.30	0.93	0.19	CO ₂ 3.78 Cl trace S 0.18 NiO trace BaO trace Cu none	100.65	
51 A2. II	41.94	15.36	3.27	9.89	5.01	9.47	5.15	0.19	3.29		4.15		0.25	CO ₂ 2.47	100.44	
52 A3. III	38.45	19.68	4.01	11.15	6.65	9.37	2.77	1.72	1.49				trace	CO ₂ 4.82	100.11	
53 A1. I	48.22	14.27	2.46	9.00	6.24	8.45	2.90	1.93	1.66	0.28	2.79	0.61	0.20	CO ₂ 0.15 SO ₃ none Cl 0.10 F 0.05 FeS ₂ 0.36 V ₂ O ₅ 0.03 NiO 0.03 BaO 0.04 SrO trace CuO trace	99.80	
54 A2. II	40.03	10.88	12.24	5.12	4.13	11.74	3.67	3.33	2.22		5.46	0.76	trace	CO ₂ 1.15	100.73	
55 A2. II	43.26	14.01	7.17	5.41	5.57	10.09	2.83	3.78	2.74	0.49	1.81	1.18	0.34	CO ₂ 1.57 S 0.21	100.46	
56 A2. II	50.99	15.62	8.47	1.43	5.23	6.53	3.39	3.05	2.48	1.39	0.67	0.53	trace	NiO 0.07	99.85	
57 A1. I	47.25	15.14	5.05	4.95	6.87	9.98	2.39	2.60	2.12	0.40	1.22	0.25	0.17	CO ₂ 1.87 S none V ₂ O ₅ 0.05 NiO 0.02 BaO 0.08 SrO 0.05	100.46	2.906
58 A1. I	43.98	13.30	3.67	6.92	7.03	10.66	2.15	1.64	1.52	0.42	1.18	0.32	0.22	CO ₂ 6.46 FeS ₂ 0.54 NiO 0.03 BaO 0.06 SrO 0.05	100.15	2.912
59 A2. II	43.68	16.91	5.06	4.01	4.76	80.7	2.37	4.44	3.39	1.95	1.24	0.72	0.07	CO ₂ 3.13	99.80	
60 A2. II	42.16	15.90	3.28	7.00	6.00	11.67	2.55	1.18	2.68		2.95	0.45	0.15	CO ₂ 4.54 S 0.20	100.71	
61 A3. III	45.96	12.68	7.63	7.94	8.25	8.36	1.88	0.98	4.10				0.61	CO ₂ 2.43	100.78	2.96
62 A3. III	42.13	16.31	6.43	7.95	7.37	9.62	2.27	2.48	3.16				0.50	CO ₂ 2.12	100.32	2.98
63 A3. III	41.99	17.58	6.67	8.33	80.3	8.53	2.12	2.81	2.99				0.29	CO ₂ 1.80	100.64	3.01
64 A2. II	39.13	11.38	7.33	8.13	8.64	11.77	2.47	1.93	2.87		4.02		0.42	CO ₂ 2.41	100.50	3.07
65 A1. I	42.22	10.62	4.74	6.18	8.68	14.80	2.46	1.41	1.16	0.50	2.49		0.05	CO ₂ 3.57 ZrO ₂ 0.73 S 0.12 Cr ₂ O ₃ 0.10 V ₂ O ₅ 0.05 BaO 0.04 SrO none	100.42	
66 A3. III	45.55	15.40	2.43	9.12	5.20	7.70	4.54	2.04	2.35		4.45			CO ₂ 2.15	100.93	

LAMPROPHYRES—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
50	Mount Gunstock, Belknap Mountains, New Hampshire.	H. S. Washington.	Pirsson and Washington, A. J. S., XXII, p. 500, 1906.	Camptonite.	In W. T., p. 319.
51	Livermore Falls, Campton, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XVII, p. 150, 1878.	"Diorite" (camptonite).	Not in W. T.
52	Campton Falls, Grafton County, New Hampshire.	L. G. Eakins.	J. P. Iddings, U. S. G. S. B. 150, p. 241, 1898.	Camptonite.	In W. T., p. 417.
53	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, U. S. G. S. B. 209, p. 87, 1903.	Camptonite.	Altered. V_2O_5 sub- tracted from P_2O_5 . In W. T., p. 319.
54	Oxford, New Jersey.	P. Jannasch.	H. Rosenbusch, Elem. Gest., p. 235, 1898.	Camptonite.	
55	Mossy Creek, Augusta County, Virginia.	J. M. Watson.	Watson and Cline, B. G. S. A., XXIV, p. 326, 1913.	Camptonite.	
56	Stinkingwater Canyon, Yellowstone National Park.	W. H. Melville.	J. P. Iddings, U. S. G. S. Mon. 32, (II), p. 340, 1899.	Camptonite.	In W. T., p. 275.
57	Snowstorm Peak, La Plata Mountains, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. Fol. 60, p. 7, 1899.	Camptonite.	In W. T., p. 317.
58	Indian Trail Ridge, La Plata Mountains, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. Fol. 60, p. 7, 1899.	Camptonite.	In W. T., p. 321.
59	Crazy Basin, Bradshaw Mountains, Arizona.	G. Steiger.	C. Palache, U. S. G. S. B. 228, p. 199, 1904.	Camptonite.	Not in U. S. G. S. Fol. 126, 1905.
60	Lago Sarmiento, Patagonia, Chile.	G. Nyblom.	P. D. Quensel, B. G. Inst. Ups., XI, p. 96, 1911.	Camptonite.	
61	Binniaro Firth, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edin., XXXIX, p. 887, 1900.	Camptonite.	In W. T., p. 335.
62	Wart of Skail, Sandwick, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edin., XXXIX, p. 887, 1900.	Camptonite.	In W. T., p. 343.
63	Rennibuster, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edin., XXXIX, p. 887, 1900.	Camptonite.	In W. T., p. 345.
64	Hoxa, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edin., XXXIX, p. 887, 1900.	Camptonite.	In W. T., p. 343.
65	Sailean Sligenachs, Argyll, Scotland.	E. G. Radley.	J. J. H. Teall, G. S. Scot. Mem. Sh. 45, p. 126, 1908.	Camptonite.	
66	Hvinden, Gran, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 60, 1899.	Camptonite.	In W. T., p. 323.

LAMPROPHYRES—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
67 A2. II	44.22	12.73	5.68	5.18	6.98	11.57	2.12	1.71	2.74		2.50	1.05	0.45	CO ₂ 3.66	100.59	
68 A3. III	40.60	12.55	5.47	9.52	8.96	10.80	2.54	1.19	2.28		4.20			CO ₂ 2.68	100.79	
69 B2. III	43.85	15.25	7.63	4.57	4.47	8.54	4.22	4.04	1.80	0.63	3.25	0.79	0.33	CO ₂ 1.67	101.04	2.778
70 A3. III	38.46	17.75	5.09	12.66	7.50	7.86	4.56	1.73	2.97		1.12			CO ₂ 0.56	100.26	
71 A1. I	38.74	12.47	7.97	5.54	9.32	11.71	2.65	1.82	5.03		0.71	0.80	0.05	CO ₂ 2.33 Cl 0.02 F 0.68 S 0.36 BaO 0.05	100.22	2.910
72 A2. II	43.50	7.30	5.41	7.27	11.01	11.69	1.61	0.54	3.82	0.13	3.84	0.73	0.30	CO ₂ 2.93	100.08	3.008
73 A3. III	51.48	16.37	5.71	4.64	1.81	3.60	5.86	4.09	5.82			0.21			99.59	
74 A2. II	49.09	13.72	0.95	7.27	11.97	8.35	2.66	1.27	1.96		1.05		0.32	CO ₂ 0.95 SO ₂ 0.10 Cr ₂ O ₃ 0.09	99.75	
75 B2. III	41.80	19.00	5.04	8.07	2.31	9.80	1.79	1.33	3.97	2.50	3.30	0.70	0.17	CO ₂ 0.30	100.08	
76 B2. III	40.37	18.60	5.36	7.74	2.31	10.90	2.95	1.70	2.09		3.60	1.30	0.07	CO ₂ 3.10	100.09	
77 B2. III	34.50	19.50	3.60	9.07	2.46	8.90	1.59	1.61	4.22	1.62	3.10	0.76	0.14	CO ₂ 9.10	100.17	
78 A2. II	50.38	15.68	1.49	5.65	9.48	7.21	2.86	3.48	2.82		0.59	trace	0.11	CO ₂ 0.81	100.56	
79 A3. III	42.40	13.94	11.32	0.84	2.53	11.95	6.38	1.25	4.37						99.78	
80 A3. III	55.17	13.49	3.10	3.55	8.55	3.15	4.43	1.09	4.27				0.39	CO ₂ 3.27	100.46	
81 A2. II	54.51	10.70	2.43	2.99	10.46	2.92	2.94	3.56	4.96		1.21	0.48	trace	CO ₂ 2.74 BaO 0.11	100.01	

GABBRO.

1 A2. II	52.19	14.52	3.19	6.27	6.51	8.88	3.65	1.53	0.53		0.72	1.43	trace	CO ₂ 0.66	100.08	
2 A2. II	49.32	13.33	1.28	7.76	11.13	11.73	2.12	1.12	0.64		0.42	0.06		CO ₂ 0.89	99.80 (99.82)	
3 A2. II	57.62	16.44	2.34	4.89	2.53	6.40	2.91	1.52	1.15	0.20	0.64	0.29	0.27	CO ₂ 3.75	100.95	
4 A3. III	49.19	18.71	5.03	4.04	5.92	7.98	1.44	0.77	5.05					CO ₂ 1.82	99.95	

LAMPROPHYRES—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
67	Kjöse Aklungen, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 51, 1899.	Camptonite.	In W. T., p. 323.
68	Maena, Gran, Norway.	L. Schmelck.	W. C. Brögger, Q. J. G. S., L, p. 26, 1894.	Camptonite.	In W. T., p. 345.
69	Ziegenberg, near Nestersitz, Bohemia.	F. Hanusch.	J. E. Hibsich, T. M. P. M., XIV, p. 101, 1894.	Camptonite.	In W. T., p. 341.
70	Mulatto, Tyrol.	J. A. Ippen.	J. A. Ippen, Sb. Ak. W. Wien, CXI, p. 234, 1902.	Camptonite.	
71	Taganrog, Russia.	J. Morozewicz.	J. Morozewicz, Mem. C. G. Rus., No. 8, p. 42, 1903.	Camptonite.	
72	Buffelspruit, near Warmbaths, Transvaal.	M. Dittrich.	P. A. Wagner, Tr. G. Soc. S. Af., XV, p. 27, 1912.	Camptonite.	
73	Portobello Bay, Otago Harbor, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 398, 1906.	Camptonite.	
74	Galena Gulch, Mount Rangitoto, Mikonui, New Zealand.	J. S. MacLaurin.	P. G. Morgan, G. S. N. Z. B. 6, p. 141, 1908.	Camptonite.	
75	Blackwater River, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Camptonite.	
76	Haggard Creek, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Camptonite.	
77	Blackwater River, Westport District, New Zealand.	Not stated.	P. G. Morgan, pers. com.	Camptonite.	
78	Oberlichtenau, Lausitz.	P. J. Beger.	P. J. Beger, Vh. Sachs. Ges. W., LXV, p. 376, 1913.	Spessartite.	
79	Kostelic, Bohemia.	J. Friedrich.	K. Hinterlechner, Jb. G. R.-A. Wien, LII, p. 171, 1903.	Spessartite.	
80	Vera, Cabo de Gata, Spain.	A. Osann.	A. Osann, Z. D. G. G., XLI, p. 311, 1889.	Verite.	In W. T., p. 263.
81	Vera-Garrucha, Cabo de Gata, Spain.	M. Dittrich.	A. Osann, Rosenb. Fests., p. 277, 1906.	Verite.	

GABBRO.

1	Cote St. Pierre, near Ottawa, Quebec.	M. Dittrich.	A. Osann, Can. G. S. A. R., XII, p. 62, 1902.	Mica-hypersthene gabbro.	
2	Buckingham, Ottawa County, Quebec.	M. Dittrich.	A. Osann, Can. G. S. A. R., XII, p. 41, 1902.	Enstatite gabbro.	
3	Milnesville, Augusta County, Virginia.	J. G. Dinwiddie.	Watson and Cline, B. G. S. A., XXIV, p. 313, 1913.	Quartz gabbro.	
4	Lower Quinnesec Falls, Menominee River, Michigan.	R. B. Riggs.	G. H. Williams, U. S. G. S. B. 62, p. 89, 1890.	Gabbro-diorite.	Schistose. In W. T., p. 431.

GABBRO—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5 A3. III	38.05	24.73	5.65	6.08	11.58	1.25	2.54	1.94	7.53					CO ₂ 0.93	100.28	
6 A2. II	48.23	18.26	1.26	6.10	10.84	9.39	1.34	0.73	2.00	0.26	1.00	0.07		CO ₂ 0.43	99.91	
7 A3. III	49.07	17.21	0.46	12.18	3.60	9.66	2.96	trace	1.55				trace	CO ₂ 2.70	99.89	
8 A3. III	35.81	14.32	7.38	15.25	10.49	7.23	2.06	0.37	5.25		2.30		0.18	BaO none SrO none	100.62	3.08
9 A2. II	49.42	13.58	3.98	3.59	5.06	18.15	2.22	1.42	0.50	0.28	0.71	1.38			100.29	
10 A2. II	48.58	20.23	1.26	3.02	7.59	14.01	2.25	0.19	2.68	0.28	0.09	trace	trace	S 0.10 NiO none BaO none SrO none	100.25	
11 A2. II	45.86	15.52	1.84	3.22	11.71	15.57	0.86	0.12	3.70	1.38	0.22	none	0.07	CO ₂ none S 0.06 BaO none SrO none	99.93	
12 A1. I	44.19	20.66	0.52	3.26	11.90	10.76	1.35	1.03	5.19	0.74	0.12	trace	0.11	CO ₂ 0.06 ZrO ₂ none S trace Cr ₂ O ₃ 0.15 NiO 0.03 BaO 0.04 SrO 0.05	100.16	
13 A3. III	47.49	15.81	1.07	4.50	10.39	15.53	1.16	trace	1.83	1.20		trace	0.41	NiO 0.06	99.45	
14 A3. III	45.69	13.30	1.85	4.72	13.06	13.50	1.36	trace	2.47	2.29		0.06	0.24	CO ₂ 1.89 SO ₂ 0.43	100.86	
15 A2. II	45.18	14.69	1.94	8.91	8.98	9.36	3.14	0.94	3.80		2.00	0.35	0.16	CO ₂ 0.32 S 0.20 BaO 0.05	100.02	
16 A1. I	48.00	24.74	0.18	11.03	9.94	0.99	0.84	1.47	0.97	0.06	0.99	0.06	0.24	FeS ₂ 0.59 Cr ₂ O ₃ 0.21 V ₂ O ₅ trace NiO none BaO 0.05	100.36	
17 A3. III	71.63	12.21	1.71	1.48	1.01	11.00	0.54	trace	n. d.				trace		99.58	2.921
18 B3. IV	70.42	12.69	1.72	2.10	0.89	11.34	0.23	trace	n. d.				trace		99.39	2.945
19 A4. IV	69.54	12.38	2.58	1.68	0.97	10.46	trace	trace	2.07				trace		99.68	2.845
20 A3. III	69.53	12.98	1.27	1.99	1.02	8.87	0.94	1.85	1.29				trace		99.74	2.687
21 A4. IV	69.33	12.62	0.79	2.26	0.79	11.53	trace	trace	2.66				trace		99.98	2.798
22 A3. III	60.48	16.07	2.95	3.55	3.23	5.79	3.92	1.70	1.80				trace		99.49	2.766
23 A3. III	47.02	15.86	0.94	3.96	13.99	11.43	1.91	0.20	4.49	0.18					99.93	

GABBRO—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	Sturgeon Falls, Menominee River, Michigan.	R. B. Riggs.	G. H. Williams, U. S. G. S. B. 62, p. 76, 1890.	Gabbro.	Altered. In W. T., p. 431.
6	Crystal Falls, Michigan.	G. Steiger.	J. M. Clements, J. G., VI, p. 382, 1898.	Bronzite norite.	Also in U. S. G. S. Mon. 36, p. 245, 1899. In W. T., p. 331.
7	Bashitanaqueb Lake, Cook County, Minnesota.	A. D. Meeds.	N. H. Winchell, G. S. Minn. A. R. 21, p. 151, 1893.	Gabbro.	In W. T., p. 331.
8	Duluth, Minnesota.	A. N. Winchell.	A. N. Winchell, A. G., XXVI, p. 374, 1900.	Troctolite.	In W. T., p. 435.
9	Elkhorn District, Montana.	W. T. Schaller.	W. H. Weed, U. S. G. S. B. 419, p. 93, 1910.	Gabbro.	"Lime enriched."
10	Beverley Creek, Kittitas County, Washington.	H. N. Stokes.	G. O. Smith, U. S. G. S. Fol. 106, p. 6, 1904.	Gabbro.	In W. T., p. 289.
11	Riddles quadrangle, Oregon.	G. Steiger.	G. F. Kay, U. S. G. S. B. 419, p. 167, 1910.	Gabbroic greenstone.	
12	Panther Mountain, Port Oriord quadrangle, Oregon.	W. F. Hillebrand.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Metagabbro.	
13	Bagley Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 404, 1891.	Gabbro.	In W. T., p. 337.
14	Bagley Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 404, 1891.	Gabbro.	In W. T., p. 431.
15	Rio Pinto, Patagonia, Chile.	R. Mauzelius.	P. D. Quensel, B. G. Inst. Ups., XI, p. 74, 1911.	Essexite-gabbro.	
16	Cuférnach, near Huntley, Aberdeenshire, Scotland.	E. G. Radley.	J. J. H. Teall, pers. com.	Cordierite norite.	Contact of norite and phyllite.
17	Penmaenmawr, Wales.	L. Schaub.	L. Schaub, N. J., I, p. 117, 1905.	Quartz norite.	
18	Penmaenmawr, Wales.	L. Schaub.	L. Schaub, N. J., I, p. 118, 1905.	Quartz norite.	
19	Penmaenmawr, Wales.	L. Schaub.	L. Schaub, N. J., I, p. 120, 1905.	Quartz norite.	
20	Penmaenmawr, Wales.	L. Schaub.	L. Schaub, N. J., I, p. 113, 1905.	Quartz norite.	
21	Penmaenmawr, Wales.	L. Schaub.	L. Schaub, N. J., I, p. 119, 1905.	Quartz norite.	
22	Penmaenmawr, Wales.	L. Schaub.	L. Schaub, N. J., I, p. 105, 1905.	Quartz norite.	
23	High Boss, Holyhead Island, Anglesey, Wales.	J. O. Hughes.	A. Harker, Rep. B. A. A. S., p. 285, 1908.	Gabbro.	

GABBRO—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
24 A2. II	47.13	8.48	6.15	5.54	13.61	11.34	1.28	0.22	3.90		0.53	0.32	0.64	CO ₂ 0.47	99.66	
25 A2. II	48.41	16.15	1.39	8.61	7.12	11.83	2.34	0.60	0.95	0.27	1.19	0.22	0.18	CO ₂ 0.91 SO ₃ trace S 0.12 BaO none	100.29	
26 A3. III	39.95	13.05	2.30	5.95	23.30	6.30	1.54	1.22	7.00		0.26				100.87	
27 A2. II	50.22	22.74	3.32	3.62	4.51	10.35	3.25	1.21	0.26		0.25	none		S 0.25	99.98	
28 A3. III	51.28	15.14	1.30	6.29	10.64	11.67	1.99	0.30	0.47		0.35	trace	trace		99.43	
29 A2. II	47.80	20.01	5.57	6.21	5.46	10.82	0.46	0.15	0.95	0.02	1.00	0.65		CO ₂ 0.03 SO ₃ 0.57	99.70	
30 A2. II	47.60	16.89	6.12	5.69	4.70	8.37	4.29	0.39	1.01	none	0.86	2.04		CO ₂ none SO ₃ 1.83	99.79	
31 A2. II	47.40	16.29	1.57	5.55	8.13	17.57	0.71	0.51	0.87	0.05	0.50	0.58		CO ₂ 0.07 SO ₃ 0.49	100.34	
32 A2. II	36.58	3.69	11.16	4.10	30.68	2.58	0.25	8.45	0.64	0.26	0.77			CO ₂ 0.31 SO ₃ 0.23	99.90	
33 A2. II	45.76	16.39	5.57	4.92	8.74	14.63	1.42	0.42	0.57		0.84	0.04		CO ₂ 0.50 SO ₃ 0.37	100.17	
34 A2. II	50.16	14.62	3.07	9.54	5.78	9.36	3.43	0.49	1.85		1.42	0.36	0.14		100.22	
35 A3. III	46.67	15.59	3.15	10.19	7.76	12.45	1.19	1.35	0.72					CO ₂ 1.31	100.38	
36 A3. III	47.98	19.83	5.34	1.39	3.89	10.73	3.35	0.48	5.01	0.36		1.57			99.93	2.98
37 A3. III	46.81	19.95	6.06	3.00	4.22	3.91	3.98	4.19	4.21	0.32		3.22			99.87	2.84
38 A3. III	46.52	13.53	2.42	7.62	4.32	14.46	1.88	0.99	5.96	0.27		1.79			99.76	3.02
39 A3. III	45.64	15.64	7.30	4.97	6.02	3.82	3.05	3.74	4.40	0.50		5.09			100.17	2.86
40 A3. III	41.68	21.76	2.01	2.04	12.74	10.39	1.46	0.29	6.74	0.46	trace	trace		S 0.07	99.65	
41 A2. II	50.42	16.72	4.32	2.70	3.77	13.36	4.24	1.52	2.24		0.07		0.68		100.04	2.918
42 A3. III	47.22	20.09	5.51	2.02	4.39	6.93	2.56	1.52	8.88		trace		0.66		99.78	2.604

GABBRO—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
24	Rockmount, Isle of Man.	P. Holland.	Dickson and Holland, Pr. Liv. G. Soc., VI, p. 129, 1889.	Gabbro.	Not in W. T.
25	Porcupine Bank, Lat. 53° 27' N., Long. 13° 37' W., West of Ireland.	Not stated.	Cole and Crook, G. S. Irel. Mem., p. 8, 1910.	Olivine gabbro.	
26	La Rivandiere, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 115, 1913.	Troctolite.	
27	Skouge, Lindaes, n. Bergen, Norway.	Lillejord.	C. F. Kolderup, Berg. Mus. Harb., No. 12, p. 36 1903	Saussuritized gabbro.	
28	Nuljuvaara, Rovaniemi, Finland.	N. Sahlbom.	V. Hackman, B. G. G. Fin., No. 15, p. 59, 1905.	Uralite gabbro.	
29	Braunberg, n. Seeheim, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4) XXVII, p. 12, 1906.	Gabbro.	
30	Waldsaum, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4) XXVII, p. 12, 1906.	Gabbro.	
31	Lohberg, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4) XXVII, p. 12, 1906.	Gabbro-diorite.	Not fresh.
32	Nieder Beerbach, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4) XXVII, p. 14, 1906.	Olivine gabbro.	
33	Ober Ramstadt, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 29, 1912.	Gabbro.	
34	Bautzen, Lausitz.	M. Voigt.	M. Voigt, In. Diss. Leip., p. 18, 1906.	Norite.	
35	Der Gugl, Dobschau, Bohemia.	A. Silek.	J. Woldrich, B. Ac. Sc. Prag, XVII, p. 395, 1912.	Gabbro.	
36	Clemgia, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Ecl. G. Helv., VIII, p. 205, 1903.	Saussurite gabbro.	
37	Clemgia, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Ecl. G. Helv., VIII, p. 207, 1903.	Saussurite gabbro.	
38	Clemgia, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 215, 1909.	Hornblende gabbro.	
39	Clemgia, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Ecl. G. Helv., VIII, p. 207, 1903.	Biotite gabbro.	
40	Gorgona Island, Tuscan Archipelago.	E. Manasse.	E. Manasse, Mem. A. d'Ach., p. 63, 1903.	Euphotide (saussurite gabbro).	Also in Mem. Soc. Tosc., XX, p. 47, 1904.
41	Dalnaja Gora, Ural Mountains.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XXIII, p. 125, 1904.	Gabbro.	Weathered from No. 115, III.5.3.4.
42	Dalnaja Gora, Ural Mountains.	J. Morozewicz.	J. Morozewicz, T. M. P. M., XXIII, p. 125, 1904.	Gabbro.	Kaolin-like. Weathered from No. 115, III.5.3.4.

GABBRO—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
43	Mount Popretschnaia, Tagil District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. Min. Fr., XXXIII, p. 360, 1910.	Gabbro.	Altered.
44	Katechersky, Koswinsky, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 214, 1902.	Gabbro.	
45	Pharkowsky-Ouwal, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 145, 1902.	Gabbro.	
46	Loss Point, Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 478, 1905.	Gabbro.	Uralitized.
47	Tilai Mountains, Iow District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 358, 1910.	Olivine gabbro.	
48	Kypriano, Laurium, Attica, Greece.	R. Lepsius.	R. Lepsius, Geol. Attika, p. 101, 1893.	Hornblende gabbro.	In W. T., p. 285.
49	Vilika, Laurium, Attica, Greece.	R. Lepsius.	R. Lepsius, Geol. Attika, p. 98, 1893.	Gabbro.	In W. T., p. 335.
50	Laurium, Attica, Greece.	R. Lepsius.	R. Lepsius, Geol. Attika, p. 102, 1893.	Gabbro.	In W. T., p. 435.
51	Plaka, near Laurium, Attica, Greece.	R. Lepsius.	R. Lepsius, Geol. Attika, p. 97, 1893.	Gabbro.	In W. T., p. 435.
52	Kaisariani, Mount Hymettos, Attica, Greece.	R. Lepsius.	R. Lepsius, Geol. Attika, p. 99, 1893.	Olivine gabbro.	In W. T., p. 435.
53	Gochasa River, Karabagh, Armenia.	Not stated.	A. S. Ginsberg, Ann. Inst. Poly. Pet. Gr., XX, p. 66, 1913.	Olivbonb gae.r	
54	Kakoulima, French Guinea.	Pisani.	A. Lacroix, N. Arch. Mus., III, p. 114, 1911.	Gabbro.	
55	Riasanov Trail, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 418, 1910.	Gabbro.	Not fresh.
56	Kali Soeroean, Loh-oelo, Java.	N. Sahlbom.	G. Niethammer, T. M. P. M., XXVIII, p. 240, 1909.	Olivine norite.	
57	Boppy, Broken Hill, New South Wales.	J. C. H. Mingaye.	G. W. Card, pers. com.	Hornblende norite.	
58	Long Gulley, Dun Mountains, Nelson, New Zealand.	J. S. MacLaurin.	J. M. Bell, G. S. N. Z. B. 12, p. 35, 1911.	Prehnite rodingite.	
59	Serpentine Valley, Dun Mountains, Nelson, New Zealand.	J. S. MacLaurin.	J. M. Bell, G. S. N. Z. B. 12, p. 35, 1911.	Prehnite rodingite.	
60	Roding River, Dun Mountains, Nelson, New Zealand.	J. S. MacLaurin.	J. M. Bell, G. S. N. Z., B. 12, p. 33, 1911.	Rodingite.	

DIABASE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Garthby, Quebec.	M. F. Connor.	J. A. Dresser, Can. G. S. Mem. 22, p. 33, 1913.	Diabase.	
2	Gowganda, Ontario.	N. L. Bowen.	N. L. Bowen, J. G., XVIII, p. 667, 1910.	Diabase.	
3	Rocky Islet Bay, Rainy Lake, Ontario.	M. F. Connor.	A. C. Lawson, Can. G. S. Mem. 40, p. 50, 1913.	Greenstone schist.	
4	Aroostook Falls, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, U. S. G. S. B. 165, p. 176, 1900.	Diabase.	In W. T., p. 285.
5	Mars Hill, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, U. S. G. S. B. 165, p. 179, 1900.	Diabase.	In W. T., p. 327.
6	Auburn, Maine.	Packard.	G. P. Merrill, A. G., X, p. 54, 1892.	Diabase.	In W. T., p. 437.
7	Lewiston, Maine.	Packard.	G. P. Merrill, A. G., X, p. 54, 1892.	Diabase.	In W. T., p. 437.
8	Mount Ascutney, Vermont.	W. F. Hillebrand.	R. A. Daly, U. S. G. S. B. 209, p. 88, 1902.	Diabase.	In W. T., p. 329.
9	Littleton, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XII, p. 133, 1876.	Metadiabase.	Not in W. T.
10	Livermore Falls, Campton, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XVII, p. 150, 1878.	Olivine diabase.	Not in W. T.
11	Livermore Falls, Campton, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XVII, p. 150, 1878.	Diabase.	Not in W. T.
12	Mount Tom, Massachusetts.	W. F. Hillebrand.	B. K. Emerson, J. G., X, p. 510, 1902.	Holyokeite (altered diabase).	
13	Holyoke, Massachusetts.	G. Steiger.	B. K. Emerson, B. G. S. A., XVI, p. 112, 1905.	Quartz diabase.	
14	Leverett, Massachusetts.	L. G. Eakins.	B. K. Emerson, U. S. G. S. Mon. 29, p. 345, 1898.	Diabase.	Altered. Not in W. T.
15	Maltby Park, New Haven, Connecticut.	G. W. Hawes.	G. W. Hawes, A. J. S., XI, p. 125, 1876.	Metamelaphyre.	Not in W. T.
16	Lake Saltonstall, n. New Haven, Connecticut.	G. W. Hawes.	G. W. Hawes, A. S. S., IX, p. 190, 1875.	Diabase.	Not in W. T.
17	Near Meriden, Connecticut.	H. N. Stokes.	B. K. Emerson, B. G. S. A., VIII, p. 77, 1897.	Diabase pitch- stone.	Also in U. S. G. S. Mon. 29, p. 437, 1898. In W. T., p. 329.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
18 A3. III	46.54	14.90	3.54	9.83	4.86	7.94	2.43	0.60	4.52				0.35	CO ₂ 4.35	99.85	2.83
19 A1. I	47.55	16.65	4.94	5.12	5.63	4.77	4.20	2.52	5.57	0.24	0.87	0.27	0.46	CaCO ₃ 0.34 Cl 0.10 F 0.06 S 0.01 C 0.80	100.10	
20 A2. II	52.83	13.79	4.42	7.86	5.61	8.99	2.42	1.46	1.30	0.71	1.18	0.31		CO ₂ trace S trace	100.88	
21 A2. II	52.34	12.46	3.37	10.08	3.97	7.88	2.26	1.66	1.46	0.14	2.96	1.19	0.11	CO ₂ trace S 0.18	100.06	3.097
22 B2. III	49.65	13.93	4.11	9.78	4.89	9.05	2.86	1.71	1.49	0.09	3.03	0.32	0.14	CO ₂ trace S 0.20	101.25	
23 A2. II	48.99	13.93	2.45	10.94	6.29	10.02	2.59	0.80	1.47	0.09	3.33	0.33	0.11	CO ₂ trace S trace	100.34	
24 A2. II	48.10	15.25	2.57	8.28	9.33	11.11	1.48	0.35	1.22	0.53	0.69	0.11	0.15	CO ₂ 0.83 S 0.20	100.20	
25 A2. II	43.62	17.30	14.13	6.83	2.34	1.63	3.45	3.03	2.93	0.30	2.75	1.34	trace	Cr ₂ O ₃ none NiO none BaO 0.09 SrO trace	99.74	
26 A2. II	48.85	15.83	2.50	10.79	5.82	6.20	2.79	1.31	3.77	0.27	1.28	0.22	0.11	CO ₂ none SO ₃ 0.06 BaO none SrO 0.09	99.89	
27 A3. III	46.98	17.85	3.13	10.30	7.10	8.47	2.04	0.60	1.97	1.55		0.14	0.26	CO ₂ 0.20 Cl 0.07 S 0.10	100.76	2.83
28 A3. III	47.99	16.57	6.01	5.13	6.01	9.36	2.00	1.39	2.64		2.71		trace		99.81	
29 A3. III	46.99	18.47	4.44	7.24	6.03	9.53	3.37	0.33	3.90				trace		100.30	2.901
30 A3. III	46.13	19.79	7.24	3.79	7.27	11.43	2.55	0.52	1.83				trace	CO ₂ 0.29	100.84	2.877
31 A2. II	45.21	15.85	9.55	4.37	7.35	10.36	2.47	0.31	1.36	0.47	2.14	0.17	0.89	CO ₂ 0.48 Cl 0.04 S 0.07	100.99	
32 A2. II	46.85	22.62	5.12	1.58	2.01	1.25	0.80	2.66	8.25	3.12	1.12	0.16	2.54	CO ₂ 1.89 NiO 0.08 BaO 0.10	100.15	
33 A2. II	41.60	37.20	3.21	0.30	0.02	0.23	0.07	—	13.54	0.29	3.79	0.14	0.08	CO ₂ 0.38 BaO trace	100.85	
34 A1. I	46.47	16.28	3.15	8.96	6.56	7.90	3.64	0.21	3.89	0.28	1.28	0.13	0.09	CO ₂ 1.26 SO ₃ none F trace Cr ₂ O ₃ 0.01 BaO none SrO none Cu trace	100.11	
35 A3. III	48.35	15.40	4.04	4.63	11.61	10.38	1.87	0.35	3.60					CO ₂ 0.08	100.31	
36 A1. I	48.07	19.02	7.65	4.83	3.30	9.84	2.84	0.63	1.69	0.43	1.72	none	0.21	CO ₂ none E 0.11 Cr ₂ O ₃ 0.18 BaO 0.02 SrO 0.02	100.56	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
18	South Durham Mountain, Connecticut.	G. W. Hawes.	G. W. Hawes, A. J. S., IX, p. 191, 1875.	Diabase.	Not in W. T.
19	Stark's knob, Saratoga, New York.	E. W. Morley.	H. P. Cushing, N. Y. St. Mus. B. 169, p. 129, 1914.	Diabase.	
20	Rose's mill, Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, Va. G. S. B. III A, p. 158, 1913.	Diabase.	Not fresh.
21	Tye River, Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, Va. G. S. B. III A, p. 158, 1913.	Diabase.	
22	Roseland, Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, Va. G. S. B. III A, p. 158, 1913.	Diabase.	
23	Piney River, Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, Va. G. S. B. III A, p. 158, 1913.	Diabase.	
24	Cross Keys, Augusta County, Virginia.	J. W. Watson.	Watson and Cline, B. G. S. A., XXIV, p. 328, 1913.	Olivine diabase.	
25	Boone, Watauga County, North Carolina.	H. N. Stokes.	A. Keith, U. S. G. S. B. 168, p. 53, 1900.	Amygdaloid.	Metamorphosed. In W. T., p. 437.
26	Marquette District, Michigan.	G. Steiger.	C. R. Van Hise, U. S. G. S. B. 148, p. 98, 1897.	Altered greenstone.	In W. T., p. 319.
27	Lighthouse Point, Marquette, Michigan.	E. E. Ware.	A. C. Lane, J. G., XII, p. 89, 1904.	Diabase.	At contact.
28	Isle Royale, Michigan.	F. F. Sharpless.	A. C. Lane, G. S. Mich., VI (1), p. 250, 1898.	Diabase.	"Relatively fresh." Not in W. T.
29	Isle Royale, Michigan.	F. P. Burrall.	A. C. Lane, G. S. Mich., VI (1), p. 215, 1898.	Melaphyre.	Not in W. T.
30	Isle Royale, Michigan.	F. P. Burrall.	A. C. Lane, G. S. Mich., VI (1), p. 143, 1898.	Melaphyre.	Not in W. T.
31	St. Marys, Michigan.	F. K. Owitz.	A. C. Lane, Korngr. Auvergn., p. 8, 1906.	Diabase.	MnO high?
32	Penokee-Gogebic region, Michigan.	T. M. Chatard.	C. R. Van Hise, U. S. G. S. Mon. 19, p. 357, 1892.	Diabase.	Altered. Cf. No. 36, III. 5.4.4-5. In W. T., p. 439.
33	Aurora Mine, Penokee-Gogebic region, Michigan.	T. M. Chatard.	C. R. Van Hise, U. S. G. S. Mon. 19, p. 357, 1892.	Diabase.	In W. T., p. 439.
34	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, U. S. G. S. Mon. 35, p. 103, 1899.	Metabasalt (diabase).	In W. T., p. 285.
35	Upper Quinnesec Falls, Menominee River, Wisconsin.	R. B. Riggs.	G. H. Williams, U. S. G. S. B. 62, p. 104, 1890.	Greenstone.	In W. T., p. 331.
36	Tamarack Creek, Minnesota.	A. W. Johnston.	F. F. Grout, J. G., XVIII, p. 644, 1910.	Diabase.	Weathered red.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
37	47.54	17.40	9.21	2.71	5.14	6.40	2.61	1.80	4.38	0.73	1.79	0.06	0.11	CO ₂ 0.15 S 0.04 Cr ₂ O ₃ 0.02 BaO 0.02	100.11	2.778
A1. I																
38	47.22	17.17	10.21	2.47	5.00	6.58	2.70	2.15	3.73	0.54	1.96	0.15	0.12	CO ₂ none S none Cr ₂ O ₃ none BaO 0.03	100.05	2.821
A1. I																
39	46.99	21.15	7.14	3.94	2.73	2.17	0.80	6.12	6.32	1.30	0.92	0.56	0.12	CO ₂ none S 0.14 Cr ₂ O ₃ 0.06 BaO none SrO 0.03	100.49	
A1. I																
40	42.35	17.24	9.90	2.69	7.01	7.47	0.93	1.48	7.13	1.57	1.84	0.14	0.15	CO ₂ 0.10 S none Cr ₂ O ₃ 0.01 BaO 0.01	100.02	2.695
A1. I																
41	46.88	17.27	2.47	8.84	6.73	8.65	2.51	1.25	3.30	0.28	1.64	0.35	0.15	S trace BaO trace	100.32	
A2. II																
42	50.90	16.71	0.40	8.50	5.14	9.74	3.50	0.60	2.12	0.03	1.80	0.07	0.13	CO ₂ 0.51 ZrO ₂ none S none BaO 0.02 SrO trace	100.17	
A1. I																
43	52.06	14.34	2.11	7.74	9.26	8.05	1.74	0.73	2.90	0.59	0.47	0.13	trace		100.12	
A2. II																
44	51.58	14.99	2.04	8.36	6.51	8.59	3.08	0.31	2.67	0.34	1.05	0.24	trace		99.76	
A2. II																
45	51.28	15.05	2.42	8.01	6.07	7.08	4.43	0.12	2.96	0.39	1.33	0.13	0.25	NiO 0.10	99.62	
A2. II																
46	49.08	14.68	1.95	9.63	6.69	10.09	4.60	0.20	1.18	0.28	1.72	0.23	0.15		100.48	
A2. II																
47	54.66	15.85	1.82	5.12	5.64	8.75	3.46	0.47	2.48	0.25	0.67	0.15	0.18	FeS ₂ 0.09 NiO trace BaO 0.04 SrO trace	100.02	
A2. II																
48	49.24	14.79	1.36	8.00	6.89	10.74	2.76	0.88	2.97	0.20	0.96	0.17	0.18	CO ₂ 0.90 BaO 0.04 SrO trace	100.08	
A2. II																
49	48.26	14.83	3.27	5.97	8.77	11.38	1.57	1.13	3.37	0.10	0.51	0.25	0.15	CO ₂ 1.24 BaO 0.05 SrO trace	100.85	
A2. II																
50	45.74	5.29	0.13	2.06	0.94	23.85	0.11	1.29	1.07	0.22	0.36	0.07	0.26	CO ₂ 18.91 FeS ₂ 0.49 BaO trace SrO none	100.79	
A2. II																
51	46.98	14.94	5.01	4.88	6.86	5.40	3.52	1.10	4.48		0.42	0.49		CO ₂ 5.39	99.47	2.703
A2. II																
52	57.56	13.83	2.46	3.63	4.67	7.27	3.96	0.48	2.66		0.17	trace	trace	CO ₂ 3.50 S none	100.19	
A2. II																
53	49.80	13.93	2.24	8.07	8.85	7.96	2.02	0.19	2.20		0.08	trace	trace	CO ₂ 4.87	100.21	
A2. II																
54	49.46	16.77	1.98	6.57	9.33	11.17	1.55	0.04	2.02		0.79	none	trace	CO ₂ 0.27 NiO trace S none	99.95	
A2. II																
55	49.07	10.60	12.03	6.57	4.68	8.58	2.56	1.76	1.70					CO ₂ 1.65	99.20	3.020
B3. IV																

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
37	Pine County, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 647, 1910.	Diabase.	Altered.
38	Pine County, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 647, 1910.	Diabase.	Altered.
39	Tamarack Creek, Minnesota.	A. W. Johnston.	F. F. Grout, J. G., XVIII, p. 644, 1910.	Diabase.	Weathered green.
40	Pine County, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 647, 1910.	Diabase.	Altered.
41	Mount Devon, Missouri.	W. F. Hillebrand.	A. Johannsen, U. S. G. S. B. 419, p. 40, 1910.	Devonite (diabase porphyrite).	Groundmass only (A. J.). Cf. p. 533.
42	Riddles quadrangle, Oregon.	G. Steiger.	G. F. Kay, U. S. G. S. B. 419, p. 167, 1910.	Diabase greenstone.	
43	Mitchell Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 412, 1891.	Diabase.	In W. T., p. 333.
44	Mitchell Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 412, 1891.	Diabase.	In W. T., p. 327.
45	Sulphur Bank, California.	W. H. Melville.	G. F. Becker, U. S. G. S. Mon. 13, p. 99, 1888.	Pseudodiabase.	In W. T., p. 327.
46	Mount St. Helena, California.	W. H. Melville.	G. F. Becker, U. S. G. S. Mon. 13, p. 98, 1888.	Pseudodiabase.	In W. T., p. 327.
47	Butte County, California.	W. F. Hillebrand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 473, 1894.	Diabase tuff.	In W. T., p. 439.
48	Jackson, Amador County, California.	W. F. Hillebrand.	H. W. Turner, U. S. G. S. A. R. 14, II, p. 473, 1894.	Melaphyre tuff.	In W. T., p. 445.
49	Browns Valley, Yuba County, California.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. B. 148, p. 228, 1897.	Diabase porphyrite.	In W. T., p. 333.
50	North Station Mine, Nevada County, California.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 17, II, p. 149, 1896.	Diabase.	Altered wall rock. In W. T., p. 439.
51	Miahuatlan, Oaxaca, Mexico.	A. Röhrig.	H. Lenk, Btr. G. Mex., II, p. 123, 1899.	Olivine diabase.	In W. T., p. 439.
52	Camans, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., p. 12, 1898.	Diabase.	Altered. In W. T., p. 245.
53	Camans, Barama River, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., p. 12, 1898.	Diabase.	Altered. In W. T., p. 439.
54	Barama District, British Guiana.	J. B. Harrison.	J. B. Harrison, Rep. G. N. W. Dist., p. 6, 1898.	Diabase.	Altered. In W. T., p. 335.
55	Rio de Janeiro, Brazil.	F. Quincke.	E. O. Hovey, T. M. P. M., XIII, p. 216, 1892.	Diabase.	In W. T., p. 311.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
56 A2. II	44.07	12.15	9.99	12.34	1.45	6.06	4.54	1.87	3.87	0.73	2.00	0.38	trace		99.45	
57 A2. II	48.63	12.49	11.72	9.08	2.37	8.75	2.46	0.64	0.80	0.79	2.20	0.77	trace		100.70	
58 A2. II	48.38	10.42	12.11	4.99	3.53	7.98	4.74	1.50	1.97	0.96	2.58	1.04	trace		100.20	
59 A3. III	51.80	16.43	1.20	10.64	5.76	4.13	3.81	0.85	3.89	1.47			0.39		100.37	
60 A2. II	48.02	13.03	2.11	9.99	4.21	9.77	2.17	0.49	4.27	1.05	3.36	0.40		SO ₃ trace F 0.06 FeS ₂ 1.24	100.16	
61 A1. I	51.31	12.67	0.54	7.99	2.19	8.17	5.21	0.54	2.31	0.04	1.92	0.90	0.45	CO ₂ 6.15 FeS ₂ 0.30 Fe ₂ S ₃ 0.17 NiO trace BaO none SrO none	100.86	
62 A2. II	42.36	14.09	2.17	10.48	5.70	10.05	3.26	0.80	2.92	0.12	4.95	1.02	0.28	CO ₂ 1.73 Cl trace S none NiO 0.09 BaO none	100.02	
63 A3. III	49.80	17.77	2.29	8.75	5.67	8.85	1.48	0.48	2.62	1.04	1.56	trace	trace		100.31	2.932
64 A2. II	62.29	12.27	1.29	8.65	2.45	3.29	0.23	2.66	1.65		1.13	0.32	0.27	CO ₂ 4.34	100.84	2.648
65 A1. I	58.47	16.11	0.85	6.90	1.58	0.94	4.34	5.18	2.08	0.43	1.18		0.46	CO ₂ 1.34 Cl 0.07 FeS ₂ 0.03 NiO none BaO 0.08 Li ₂ O none	100.31	
66 A1. I	46.73	18.73	none	10.14	3.56	8.62	3.54	0.88	3.31	0.35	2.74	0.37	0.37	CO ₂ 0.58 FeS ₂ 0.05 NiO none BaO none	99.97	
67 A1. I	39.28	12.14	2.80	7.52	3.66	12.82	4.56	0.08	2.77	0.19	3.53	0.57	0.37	CO ₂ 10.06 Cl 0.01 NiO none BaO none Li ₂ O trace	100.36	
68 A2. II	50.75	12.15	9.26	0.15	6.22	6.31	0.55	7.03	1.78		1.46		0.43	CO ₂ 3.76	99.85	
69 A3. III	39.20	18.80	8.62	5.00	10.04	9.70	1.88	0.17	4.53	0.10					100.24	
70 A1. I	47.56	14.27	1.63	6.80	4.90	10.95	4.61	0.27	2.65	0.42	2.40	0.19	0.30	CO ₂ 2.95 FeS ₂ 0.05 Fe ₂ S ₃ 0.22 NiO 0.08 BaO none	100.25	
71 A1. I	47.19	13.96	3.39	9.01	7.10	8.08	4.50	0.70	2.56	0.12	2.09	0.56	0.47	CO ₂ 0.79 FeS ₂ 0.11 NiO 0.04 BaO 0.06 Li ₂ O trace	100.73	
72 A1. I	48.58	14.58	1.89	7.65	6.36	9.80	4.02	0.43	2.93	0.68	1.77	0.19	0.46	CO ₂ 1.00 FeS ₂ 0.26 NiO 0.03 BaO none Li ₂ O none	100.63	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
56	Tagaruassu, Serra des Parecis, Matto Grosso, Brazil.	M. Goldschlag.	M. Goldschlag, In. Diss. Jena, p. 27, 1913.	Proterobase.	
57	Cerro Domingo, Sierra Villa Rica, Paraguay.	M. Goldschlag.	M. Goldschlag, In. Diss. Jena, p. 31, 1913.	Olivine diabase.	Not fresh.
58	Esperanza, Rio Estrella, Paraguay.	M. Goldschlag.	M. Goldschlag, In. Diss. Jena, p. 33, 1913.	Olivine diabase.	Not fresh.
59	Caribber Glen, Linthgow, Scotland.	G. S. Blake.	J. D. Falconer, Tr. G. Soc. Edin., XLV, p. 147, 1908.	Diabase.	Margin of sill.
60	Kettlestoun, Linthgow, Scotland.	G. S. Blake.	J. D. Falconer, Tr. R. Soc. Edin., XLV, p. 147, 1908.	Diabase.	
61	Tayvallich, Argyll, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem. Sh. 27-29, p. 87, 1911.	Diabase.	
62	Ardifuar, Crinanboch, Argyll, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem., Sh. 36, p. 55, 1909.	Diabase.	
63	Auchinstarry, Kilsyth, Dumbarton, Scotland.	D. P. Macdonald.	G. W. Tyrrell, G. Mag. (V), VI, p. 361, 1909.	Diabase.	
64	Whinsill, England.	A. M. Finlayson.	A. M. Finlayson, Q. J. (i. S.), LXVI, p. 304, 1910.	Diabase.	Altered. Cf. No. 55, III.5.3.4.
65	Trusham station, n. Newton Abbott, Devonshire, England.	E. G. Radley.	J. S. Flett, G. S. Eng. Mem., Sh. 339, p. 62, 1913.	Albite diabase.	
66	Teign, Devonshire, England.	E. G. Radley.	Dewey and Flett, G. Mag. (V), VIII, p. 208, 1911.	Albite diabase.	
67	Chipleigh Quarry, Bickington, Devonshire, England.	E. G. Radley.	J. S. Flett, G. S. Eng. Mem., Sh. 339, p. 56, 1913.	Spilite.	
68	Spencecombe, Exeter, England.	J. G. Wilson.	J. J. H. Teall, G. S. Eng. Mem., Sh. 325, p. 80, 1902.	Trap.	
69	Amlwch, Anglesey, Wales.	J. O. Hughes.	A. Harker, Rep. B. A. A. S., 1912, p. (4).	Diabase.	
70	Tregedden, Cornwall.	E. G. Radley.	Dewey and Flett, G. Mag. (V), VIII, p. 206, 1911.	Spilite.	
71	Cartuther, Cornwall.	W. Pollard.	J. S. Flett, G. S. Eng. Mem., Sh. 348, p. 100, 1907.	Proterobase.	Minverite (hornblende picrite), in H. Dewey, G. S. Eng. Sh. 337, p. 65, 1911.
72	Mullion Island, Cornwall.	W. Pollard.	Flett and Hill, G. S. Eng. Mem., Sh. 359, p. 185, 1912.	Spilite.	

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
73 A1. I	40.55	16.65	1.13	9.46	5.20	6.06	4.76	0.27	3.89	0.27	2.95	0.73	0.20	CO ₂ 7.85 Cl none S 0.10 NiO 0.07 BaO none SrO none	100.14	
74 A3. III	44.93	16.27	13.37	n. d.	6.40	1.84	2.03	0.84	12.55		1.34		0.28		99.85	2.592
75 A2. II	43.56	14.58	3.84	7.00	9.95	10.78	1.86	1.02	3.85		1.03		0.39	CO ₂ 1.93	99.79	2.923
76 B3. IV	48.50	17.20	0.40	9.23	8.22	3.19	4.08	0.49	6.20		3.46				100.97	
77 A3. III	45.80	15.10	9.44	2.34	3.92	7.70	4.33	1.38	5.00		3.12			CO ₂ 1.60	99.73	
78 A3. III	47.59	18.73	5.12	7.65	5.92	8.86	2.11	1.00	1.21		1.19		trace	CO ₂ 0.57	99.95	3.024
79 A2. II	56.33	16.25	1.22	3.46	4.89	6.92	6.26	0.39	0.80	0.15	1.76	0.96	0.13	S BaO trace none	99.52	
80 A2. II	50.29	16.00	2.14	8.36	5.92	10.22	3.24	0.62	1.52		1.35	0.18	0.27		100.11	
81 A2. II	49.68	16.40	3.46	7.50	6.20	10.14	3.00	1.12	1.52		0.70	0.09	0.32		100.13	
82 A2. II	47.18	15.76	6.11	5.38	7.88	9.18	3.09	0.44	3.89		0.59		0.56		99.96	
83 A2. II	46.19	15.29	1.27	10.90	6.76	8.53	2.45	0.38	3.70		1.51	0.13	0.19	CO ₂ 1.91 FeS ₂ 1.54	100.70	2.91
84 A2. II	45.27	14.69	2.31	11.02	8.18	9.47	2.19	0.76	3.18		1.47	0.13	0.19	CO ₂ 1.68 FeS ₂ 0.26	100.80	
85 B2. III	41.08	14.28	15.62	7.16	6.95	5.75	1.22	0.76	4.84		0.89	0.83			99.38	2.896
86 A2. II	55.04	13.83	2.19	7.39	4.78	7.08	5.90	0.36	0.77		1.15	0.08	0.20	CO ₂ 1.28 S 0.01	100.06	2.90
87 A2. II	51.05	12.68	10.23	3.89	8.30	6.83	2.96	1.06	0.33		1.22	0.13	0.35		100.03	
88 A3. III	49.70	19.31	none	8.93	8.13	12.27	1.17	0.14	0.95						100.60	
89 A2. II	49.03	16.20	5.28	4.69	16.90	4.35	1.19	0.62	0.61		0.80	none	0.15		99.82	
90 A3. III	46.52	16.11	11.76	6.31	5.45	9.79	2.20	1.83							100.38	
91 A2. II	54.23	14.37	2.26	4.76	7.71	7.00	2.56	3.30	1.79		0.89	0.48		CO ₂ 0.59 SO ₃ 0.15	100.09	2.779

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
73	Devonport, England.	W. Pollard.	J. S. Flett, G. S. Eng. Mem., Sh. 348, p. 97, 1907.	Spilite.	
74	Fort Regent, St. Helier, Jersey, Channel Islands.	P. Holland.	Holland and Dickson, Fr. Liv. G. Soc., VII, p. 114, 1897.	Diabase.	Not in W. T.
75	Fort Regent, St. Helier, Jersey, Channel Islands.	P. Holland.	Holland and Dickson, Fr. Liv. G. Soc., VII, p. 114, 1897.	Diabase.	Not in W. T.
76	Poyet, Lyonnais, France.	Pisani.	A. Michel-Levy, C. R., CLVI, p. 718, 1913.	Ortho- albitophyre.	
77	Tranchée Prola, Esterel, France.	Pisani.	A. Michel-Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 41, 1912.	Melaphyre.	
78	Mount Hellwald, Spitzbergen.	H. Backlund.	H. Backlund, Ref. N. J., II, p. 243, 1911.	Diabase.	
79	Västra Värnsingen, Nordingra, Sweden.	N. Sahlbom.	J. E. Sobral, G. Nord. Reg., p. 171, 1913.	Värnsingite (diabase pegmatite).	Not fresh.
80	Orriksdammen, Grängesberg, Sweden.	A. Grabe.	H. Johansson, G. F. F., XXXII, p. 314, 1910.	Amphibolite (altered diabase).	
81	Ormbergstjärn, Grängesberg, Sweden.	A. Grabe.	H. Johansson, G. F. F., XXXII, p. 314, 1910.	Amphibolite (altered diabase).	
82	Stadsberg, Ragunda Massif, Jemtland, Sweden.	H. Santesson.	A. G. Högbom, Af. Sv. G. Und., No. 182, p. 45, 1899.	Olivine melaphyre.	Not in W. T.
83	Rackelberget, Sala, Sweden.	G. Nyblom.	H. J. Sjögren, G. F. F., XXXII, p. 1373, 1910.	Diabase.	
84	Sala, Sweden.	G. Nyblom.	H. J. Sjögren, G. F. F., XXXII, p. 1373, 1910.	Diabase.	
85	Silfberg, Dalarue, Sweden.	O. Larsson.	M. Weibull, Lund. Un. Ar. Sk., XXXIII (2), No. 4, p. 12, 1897.	Melaphyre.	Not in W. T.
86	Kurravaara, Kiruna District, Lapland.	G. Nyblom.	A. Lundholm, G. F. F., XXXII, p. 787, 1910.	Soda greenstone.	
87	Kemi, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., No. 15, p. 61, 1905.	Uralite diabase.	
88	Impilaks, Finland.	H. Berghell.	V. Hackman, B. C. G. Fin., No. 15, p. 65, 1905.	Diabase.	Altered to hornblende schist.
89	Herajärvi, Juuka, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., No. 15, p. 68, 1905.	Uralite diabase.	CaO and MgO interchanged?
90	Kantua, Eura, Finland.	Not stated.	H. Gylling, Fin. G. Und., Bl. 12, p. 55, 1888.	Diabase.	In W. T., p. 335.
91	Söterburg, Nahe District, Rheinland.	Böttcher.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 309, 1892.	Olivine weiselbergite.	In W. T., p. 269.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
92 A2. II	52.49	15.91	8.01	0.55	5.01	5.69	3.09	2.66	4.46		0.99	0.37		CO ₂ 0.01 SO ₃ 0.08 Org. 0.98	100.30	2.622
93 A2. II	44.05	13.97	9.08	4.36	4.91	11.64	3.35	1.06	1.80	0.95	1.36	none		CO ₂ 3.85 SO ₃ 0.19	100.57	
94 A2. II	42.15	14.04	2.94	11.09	4.28	10.39	1.50	0.58	3.09	0.85	1.88	0.31		CO ₂ 5.89 SO ₃ 0.54	99.53	2.80
95 A2. II	41.79	16.29	9.92	3.25	6.55	7.97	1.06	1.63	5.07	4.08	1.80	0.74		CO ₂ 0.18 SO ₃ 0.22	100.55	2.77
96 A2. II	50.88	15.40	1.23	3.84	5.31	5.84	3.03	3.31	2.00	0.30	0.52	0.16		CO ₂ 8.46 SO ₂ 0.05	100.33	
97 A2. II	47.05	11.87	4.40	6.26	8.88	8.77	2.68	1.08	4.97	1.37	1.92	1.17			100.42	
98 A2. II	45.45	12.98	3.04	7.03	9.99	9.05	1.32	1.52	5.14	1.45	2.23	0.40		CO ₂ 0.24 SO ₃ 0.02	99.86	
99 A3. III	61.03	21.41	4.81	1.47	0.56	2.54	4.44	2.20	1.04		0.16				99.99	
100 A3. III	51.82	11.66	4.39	5.46	7.02	12.65	3.38	0.32	1.25		0.44			CO ₂ 1.01 S 0.32	100.72	3.008
101 A3. III	44.82	18.72	4.01	10.24	7.64	7.55	3.49	0.74	1.75		0.93			CO ₂ 0.63	100.43	
102 A2. II	58.69	16.55	2.69	3.59	3.65	7.72	2.85	0.11	0.46	0.42	1.62	0.69		CO ₂ 0.61 SO ₃ 0.26	99.91	2.83
103 A2. II	45.69	17.55	1.88	7.88	5.46	8.61	1.95	0.49	2.22	0.33	1.98	1.61		CO ₂ 3.66 SO ₃ 0.60	99.91	2.80
104 A2. II	43.98	15.25	2.52	9.63	8.39	9.16	1.84	0.42	3.55	0.28	1.81	2.25		CO ₂ 0.20 SO ₃ 0.63	99.91	2.96
105 A2. II	41.08	16.77	1.80	11.04	4.85	9.42	2.13	0.73	2.25	0.23	2.57	0.29		CO ₂ 6.57 SO ₃ 0.53	100.26	2.81
106 A2. II	47.33	14.76	0.91	10.06	8.71	9.11	2.43	0.58	3.20	1.92	1.26	0.04	0.05	CO ₂ 0.24 S trace	100.60	2.792
107 A2. II	47.27	14.12	4.68	7.94	7.44	5.68	3.82	1.21	3.86	0.95	1.81	0.16	0.60	CO ₂ 1.10	100.64	2.80
108 A2. II	42.48	16.52	3.94	8.19	5.61	11.46	2.43	1.19	2.80	1.07	1.74	0.21		CO ₂ 3.30	100.93	2.84
109 A2. II	50.21	16.72	4.19	5.01	6.69	7.73	2.50	2.53	3.16		0.64	0.37		CO ₂ 0.13 SO ₃ trace	99.98	2.777
110 A2. II	46.02	18.03	7.17	2.78	4.83	8.68	3.31	1.33	3.22		0.95	0.35		CO ₂ 2.90 SO ₃ trace	99.57	2.692
111 B2. III	45.83	15.43	3.04	7.96	6.19	5.92	2.32	2.19	3.67		1.61	0.29		CO ₂ 3.95	99.10	2.756

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
92	Sötern, Nahethal, Rheinland.	Bärwald.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 309, 1892.	Olivine melaphyre.	In W. T., p. 445.
93	Niederscheld, Rheinland.	Not stated.	R. Brauns, N. J. B. B., XXI, p. 311, 1906.	Diabase.	
94	Trigensteiner Schulde, Rheinland.	Not stated.	R. Brauns, N. J. B. B., XXI, p. 312, 1906.	Diabase.	
95	Oberscheld, Rheinland.	Not stated.	R. Brauns, N. J. B. B., XXI, p. 311, 1906.	Variolite.	
96	Kreigsfeld, Hesse.	Not stated.	H. Schopp, Erl. G. Kt. Hes., Bl. Fursfeld, p. 41, 1913.	Melaphyre.	
97	Annerod, Giessen, Hesse.	K. Hoffmann.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 466, 1908.	Trap.	Rich in chaba- zite.
98	Allertshausen, Giessen, Hesse.	K. M. Jene.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 466, 1908.	Trap.	Rich in chaba- zite.
99	Ruppertshain, Taunus Mountains.	L. Milch.	L. Milch, Z. D. G. G., XLI, p. 432, 1889.	Diabase.	Much altered. In W. T., p. 443.
100	Raumenthal, Taunus Mountains.	L. Milch.	L. Milch, Z. D. G. G., XLI, p. 430, 1889.	Diabase.	
101	Raumenthal, Taunus Mountains.	L. Milch.	L. Milch, Z. D. G. G., XLI, p. 430, 1889.	Diabase.	Pressed zone.
102	Steinperf, Hesse-Nassau.	G. Butzbach.	R. Brauns, N. J. B. B., XXVIII, p. 401, 1909.	Diabase.	
103	Sechshelden, Hesse-Nassau.	G. Butzbach.	R. Brauns, N. J. B. B., XXVII, p. 290, 1909.	Diabase porphyrite.	
104	Manderbacher Löhren, Hesse-Nassau.	G. Butzbach.	R. Brauns, N. J. B. B., XLVII, p. 284, 1909.	Mica diabase.	
105	Haiger, Schleierberg, Hesse-Nassau.	G. Butzbach.	R. Brauns, N. J. B. B., XXVII, p. 291, 1909.	Diabase.	
106	Radersberg, n. Herborn, Hesse-Nassau.	E. Reuning.	E. Reuning, N. J. B. B., XXIV, p. 425, 1907.	Diabase.	
107	Hartenrod, n. Herborn, Hesse-Nassau.	F. Heineck.	F. Heineck, N. J. B. B., XVII, p. 110, 1903.	Diabase.	
108	Hartenrod, n. Herborn, Hesse-Nassau.	F. Heineck.	F. Heineck, N. J. B. B., XVII, p. 137, 1903.	Diabase.	
109	Querenberg, n. Giesshübl, Thüringerwald.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L.-A., IX, p. 306, 1889.	Melaphyre.	In W. T., p. 271.
110	Sommerberg, Thüringerwald.	G. F. Steffen.	H. Loretz, Jb. Pr. G. L.-A., IX, p. 306, 1889.	Melaphyre.	In W. T., p. 447.
111	Thalexweiler, Prussia.	Not stated.	Weiss and Grebe, Erl. G. Kt. Pr., Bl. Lebach, p. 38, 1889.	Diabase.	In W. T., p. 443.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
112 A2. II	45.81	14.92	1.99	6.52	7.62	9.32	4.54	0.31	4.11		0.70	0.11		CO ₂ 3.88	99.89	2.814
113 A2. II	56.03	19.74	2.40	4.07	1.49	8.17	3.16	2.09	0.90		1.51	0.22	0.17	CO ₂ Li ₂ O 0.61 trace	100.56	
114 A3. III	55.87	19.81	1.70	3.42	5.04	4.62	2.77	1.91	2.01		2.21			CO ₂ 1.11	100.47	.
115 A2. II	52.45	17.57	1.17	4.82	4.84	11.76	2.29	1.40	1.23		0.72	0.15	0.10	CO ₂ 1.02	100.42	
116 A2. II	50.76	16.68	5.84	1.69	1.72	10.48	3.27	3.12	1.18		1.64	0.15	0.36	CO ₂ 4.02	100.91	2.73
117 A2. II	50.15	15.02	5.17	5.17	6.90	8.25	2.59	1.33	4.08		0.33	0.26		CO ₂ SO ₂ 0.32 0.09	99.66	2.753
118 A2. II	50.08	18.30	0.91	6.66	3.71	3.77	1.14	5.63	6.17		1.07	0.10	0.16	CO ₂ 2.32	100.02	
119 A2. II	45.48	17.96	1.48	5.54	4.20	10.74	3.64	2.20	1.58		1.32	0.40	0.22	CO ₂ 6.02	100.78	
120 A3. III	47.32	16.42	7.76	5.95	5.83	9.52	3.31	1.23	2.10		trace	trace	0.28	S 0.11	99.83	2.916
121 A3. III	46.21	15.23	9.97	4.42	5.94	9.43	4.52	1.18	2.74		trace	trace	0.21	S BaO SrO trace 0.11	100.04	2.954
122 A3. III	45.29	13.67	12.91	8.12	5.66	5.41	5.18	1.57	2.39		trace		0.22	As ₂ O ₃ SrO 0.07 0.31	100.80	2.939
123 A2. II	43.79	19.50	4.97	6.48	8.06	8.34	2.28	0.78	1.56		2.37	0.68		CO ₂ 1.19	100.00	
124 A2. II	52.23	17.40	1.90	5.40	6.50	2.86	4.30	1.85	5.58		1.19	0.31		CO ₂ SO ₂ C 0.75 0.10 0.09	100.46	2.637
125 A2. II	48.27	17.13	1.85	4.89	3.06	9.77	3.06	2.42	1.59		0.99	0.19		CO ₂ SO ₂ 6.90 0.09	100.21	2.733
126 A2. II	49.03	12.63	3.68	10.94	1.64	7.76	2.33	2.40	3.42		2.06	0.54		CO ₂ 3.45	100.39	2.82
127 B2. III	48.50	14.39	2.13	10.91	6.54	8.71	3.18	0.58	3.95		1.74	0.22		CO ₂ 0.15	101.00	
128 A2. II	48.47	15.51	2.52	8.46	3.83	6.36	6.26	0.44	4.38		2.05	0.23		CO ₂ SO ₂ 1.29 0.31	100.11	2.723
129 A2. II	48.28	15.53	2.50	9.01	3.80	6.07	6.10	0.82	4.51		1.88	0.32		CO ₂ SO ₂ 1.15 0.31	100.27	2.725
130 A2. II	47.88	14.77	3.01	8.32	5.99	7.68	5.51	0.32	3.88		1.92	0.24		CO ₂ SO ₂ 0.62 0.30	100.44	2.807
131 A2. II	44.69	16.27	2.16	7.16	5.00	8.98	4.65	1.30	3.86		1.91	0.18		CO ₂ SO ₂ 3.47 0.38	100.01	2.774

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
112	Blatt Allendorf, Prussia.	Not stated.	F. Beyschlag, Erl. G. Kt. Pr., Bl. Allendorf, p. 11, 1886.	Diabase.	In W. T., p. 443.
113	Albessen, Blatt Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 25, 1910.	Basaltic melaphyre.	
114	Kreimbach, Blatt Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 23, 1910.	Tholeytic diabase.	
115	Relsberg, Blatt Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 23, 1910.	Tholeytic diabase.	
116	Schallodenbach, Rheinpfalz, Bavaria.	A. Schwager.	M. Schuster, Geog. Jhft., XXVI, p. 256, 1914.	Melaphyre.	
117	Höringen, Pfalz.	K. Klüss.	A. Leppla, Jb. Pr. G. L.-A., XIV, p. 150, 1894.	Melaphyre.	In W. T., p. 323.
118	Albessen, Blatt Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 25, 1910.	Basaltic melaphyre.	
119	Pörrbach, Blatt Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 39, 1910.	Melaphyre.	
120	Neubau, Fichtelgebirge.	Deleré.	Deleré, In. Diss. Erl., 1895.	Proterobase.	Osann, II, p. 168.
121	Ochsenkopf, Fichtelgebirge.	Deleré.	Deleré, In. Diss. Erl., 1895.	Proterobase.	Epidotized. Osann, II, p. 168.
122	Hallerstein, Kirchenlaunitz, Fichtelgebirge.	Deleré.	Deleré, In. Diss. Erl., 1895.	Proterobase.	Osann, II, p. 168.
123	Wartleite, near Köditz, Fichtelgebirge.	E. Riman.	E. Riman, N. J. B. B., XXIII, p. 24, 1907.	Diabase.	
124	Pfeffelbach, near St. Wendel, Harz.	Hesse.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 316, 1892.	Diabase.	In W. T., p. 265.
125	Osterbrucken, near St. Wendel, Harz.	Fischer.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 280, 1892.	Melaphyre.	In W. T., p. 445.
126	Garkenholz, Rübeland, Harz.	K. Böttcher.	K. A. Lossen, Z. D. G. G., XL, p. 204, 1888.	Hysteroibase.	In W. T., p. 443.
127	Hüttenrode, Harz.	Not stated.	O. H. Erdmannsdoerfer, N. J. Ch., p. 40, 1909.	Diabase.	
128	Rauhe Schacht, Bruchberg, Harz.	Haefke.	O. H. Erdmannsdoerfer, Z. D. G. G., LIX, p. 18, 1907.	Analcite diabase.	
129	Rauhe Schacht, Bruchberg, Harz.	Klüss.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXIX, p. 20, 1909.	Analcite diabase.	
130	Kleine Mollnthal, Bruchberg, Harz.	Haefke.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXIX, p. 20, 1909.	Analcite diabase.	
131	Kleine Mollnthal, Bruchberg, Harz.	Klüss.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXIX, p. 20, 1909.	Arfvedsonite diabase.	

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
132 A2. II	47.42	15.06	3.36	8.20	6.19	9.58	3.82	0.71	3.61		0.71	0.24	0.58	CO ₂ 0.57 SO ₃ 0.22	100.54	2.899
133 A2. II	46.13	18.13	1.97	8.39	7.01	5.87	3.28	1.73	4.91		2.10	0.25		CO ₂ 0.60 SO ₃ 0.13	100.50	
134 A2. II	46.16	17.96	1.84	9.08	6.75	4.21	2.85	1.82	5.65		2.07	0.35		CO ₂ 1.25 S 0.20	100.19	
135 A2. II	44.70	14.12	0.97	8.85	6.07	10.20	2.34	0.14	4.79		1.71	0.15		CO ₂ 5.50	99.86	2.84
136 A2. II	43.50	14.08	6.86	7.54	6.80	10.07	3.38	1.50	3.83		0.15	0.47		CO ₂ 1.88 SO ₃ 0.47	100.38	2.907
137 A2. II	42.78	14.13	3.31	10.97	6.85	3.63	2.37	3.46	5.75		3.21	1.44		CO ₂ 1.85 SO ₃ 0.44	100.19	
138 A4. IV	50.89	14.11	7.42	5.33	5.16	10.36	3.31	0.92	3.27						100.77	
139 A4. IV	44.41	12.43	8.76	5.81	12.19	7.43	2.83	1.16	5.37						100.36	
140 A3. III	46.10	17.77	3.97	9.84	7.32	6.35	4.00	0.61	2.42		1.01				99.39	
141 A3. III	45.02	18.42	4.86	8.35	7.19	8.24	4.67	0.38	2.61		0.94				100.68	
142 A2. II	43.92	12.53	2.50	9.60	13.26	8.50	2.33	1.49	2.27		1.45	0.33	0.20	CO ₂ 1.77	100.15	
143 A2. II	58.04	15.31	3.62	5.16	1.90	4.14	3.61	2.95	4.09		0.72	0.56		SO ₃ 0.22	100.32	2.683
144 B3. IV	54.47	17.22	7.61	0.14	1.63	4.46	4.25	4.17	2.10		trace	0.51		CO ₂ 2.30 SO ₃ 0.52	99.38	
145 A3. III	49.53	18.82	6.75	4.04	2.67	6.84	4.17	2.52	2.84		trace	0.86		CO ₂ 0.32 SO ₃ 0.44	99.80	
146 A3. III	48.39	13.43	9.19	4.65	4.26	12.83	3.23	0.99	2.98			0.35	trace	S trace	100.30	
147 A3. III	46.95	17.40	6.11	3.99	5.34	7.25	4.26	1.18	5.00		2.33				99.81	
148 A3. III	50.86	14.32	5.03	6.77	5.93	9.44	3.49	1.18	2.80		trace	0.62	0.14	S 0.05	100.65	
149 A3. III	45.44	12.79	8.82	5.24	3.24	7.05	3.46	7.79	4.08	0.95	0.65				99.61	
150 A2. II	57.86	13.08	6.76	0.93	3.41	1.24	2.63	8.93	2.22	1.09	1.58	0.38	0.41	F 0.05	100.37	
151 A2. II	52.00	14.08	8.40	1.09	3.91	9.61	3.83	2.58	0.42	0.91	2.01	0.49	0.72	CO ₂ trace F 0.18	100.23	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
132	Haselthal, Bruchberg, Harz.	Eyme.	O. H. Erdmannsdoerfer, XXIX, p. 20, 1909.	Diabase.	
133	Braunesumpthal, Harz.	Not stated.	O. H. Erdmannsdoerfer, N. J. Cb., 1909, p. 40.	Diabase porphyrite.	
134	Near Wendefurth, Harz.	Not stated.	O. H. Erdmannsdoerfer, N. J. Cb., 1909, p. 40.	Diabase porphyrite.	
135	Wendefurth, Harz.	K. Gremse.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 266, 1892.	Leucophyre.	In W. T., p. 443.
136	Osteröder Rindesthal, Bruchberg, Harz.	Eyme.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXIX, p. 20, 1909.	Olivine diabase.	
137	Schieferberg, near Neuwerk, Harz.	Not stated.	O. H. Erdmannsdoerfer, N. J. Cb., 1909, p. 40.	Diabase mandelstein.	
138	Pausa, Vogtland, Saxony.	A. Uhlemann.	A. Uhlemann, T. M. P. M., XXVIII, p. 426, 1909.	Diabase.	
139	Pausa, Vogtland, Saxony.	A. Uhlemann.	A. Uhlemann, T. M. P. M., XXVIII, p. 426, 1909.	Diabase.	
140	Kohlhau, Lausitz.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 37, 1902.	Diabase.	Altered. Cf. No. 16, III.5.3.5.
141	Warmisdorf, Lausitz.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 37, 1902.	Diabase.	Altered. Cf. No. 18, III.5.3.5.
142	Gräfenhain, Lausitz.	P. J. Beger.	P. J. Beger, Vh. Sachs. Ges. W., LXV, p. 376, 1913.	Theralite diabase.	
143	Heinzelberg, Sudeten, Bohemia.	Eyme.	G. Berg, Jb. Pr. G. L.-A., XXVIII, p. 239, 1910.	Melaphyre.	
144	Langwaltersdorf, Sudeten, Bohemia.	Böhm.	G. Berg, Jb. Pr. G. L.-A., XXVIII, p. 239, 1910.	Melaphyre.	
145	Alt Lässig, Sudeten, Bohemia.	Böhm.	G. Berg, Jb. Pr. G. L.-A., XXVIII, p. 239, 1910.	Melaphyre.	
146	Skolmeno, Bohemia.	J. Friedrich.	F. Slavik, Arch. Land. d. f. Bohm, XIV (2), p. 88, 1908.	Spillite.	
147	Radotin, Bohemia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXXIII, p. 350, 1899.	Diabase.	In W. T., p. 443.
148	Brünn, Moravia.	C. v. John.	v. John and Suess, Jb. G. R.-A. Wien, LVIII, p. 249, 1908.	Uralite diabase.	
149	Zacheugraben, near Breitenau, Styria.	L. Welisch.	L. Welisch, Mt. Nw. Ver. steierm., XLVII, p. 65, 1911.	Diabase.	
150	Poreba, near Cracow, Galicia.	Z. Rosen.	Z. Rosen, B. Ac. Sci. Crac., 1909 (2), p. 838.	Melaphyre.	
151	Regularise, near Cracow, Galicia.	Z. Rosen.	Z. Rosen, B. Ac. Sci. Crac., 1909, p. 801.	Melaphyre.	

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
152	49.86	13.01	13.78	n. d.	3.50	7.26	4.00	1.66	2.08		0.69	0.38		CO ₂ 3.23	99.45	
A3. III																
153	48.16	16.17	6.94	4.64	5.62	5.66	2.60	4.87	3.75					CO ₂ 1.26	99.67	
A3. III																
154	47.59	16.84	6.33	6.62	5.48	5.99	2.23	4.43	3.30	2.10					100.91	
A3. III																
155	47.20	16.60	7.80	6.40	5.69	7.20	4.74	0.55	1.29		1.80	0.18		S 0.09	99.54	
A2. II																
156	49.64	17.02	5.51	3.69	6.96	3.52	4.93	0.97	1.12	0.24	2.02			CO ₂ 4.05	99.77	2.78
A3. III																
157	48.54	15.85	5.84	4.63	9.16	2.19	5.10	0.64	4.15	0.14	2.08			CO ₂ 1.47	99.77	2.780
A3. III																
158	45.22	14.38	6.75	5.00	6.58	11.13	4.43	0.63	1.92	0.25	1.96			CO ₂ 1.78	100.03	2.999
A3. III																
159	45.97	14.49	9.12	3.54	6.86	7.46	4.72	0.50	4.13	0.43	2.82				100.04	2.92
A3. III																
160	45.40	14.87	6.65	6.28	7.98	5.30	3.19	2.62	5.07	0.37	2.08				99.81	2.859
A3. III																
161	52.14	17.36	3.20	6.12	6.81	3.42	4.41	1.07	4.98						99.51	2.8
A3. III																
162	49.28	16.34	4.62	6.48	6.37	9.29	3.77	0.14	2.54	0.25	0.42	0.05	trace	S 0.06	99.61	
A2. II																
163	43.44	16.49	4.54	9.02	4.02	10.50	3.68	3.56	3.06		0.87		0.16		99.34	
B2. III																
164	53.17	13.62	5.42	5.96	3.84	8.67	2.95	2.40	3.56				trace		99.59	
A3. III																
165	49.97	14.22	8.14	3.79	4.14	11.21	2.79	2.39	3.50				trace		100.15	2.976
A3. III																
166	49.95	14.77	7.41	3.53	4.28	10.26	2.87	2.63	3.40				trace		99.10	
B3. IV																
167	47.50	16.20	5.25	5.76	6.41	6.15	1.09	0.87	9.00		1.67				99.90	
A3. III																
168	53.02	16.53	1.92	7.51	2.63	0.51	4.45	2.40	1.81			0.59	0.29		99.95	
A3. III																
169	53.75	11.20	12.26	0.69	9.11	5.72	0.76	0.87	4.91		0.36		0.16		100.19	2.867
A2. II																
170	51.72	12.10	7.35	6.67	6.53	8.78	1.94	0.82	1.18	0.19	2.16		0.40	CO ₂ 0.28	100.10	
A2. II																
171	50.05	14.83	8.19	3.19	6.59	9.56	2.19	0.77	0.77		1.89		1.46		99.79	
A2. II																

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
152	Near Ellman, Kitzbuchler Alps, Tyrol.	L. Obermaier.	A. Spitz, T. M. P. M., XXVIII, p. 501, 1909.	Monzonite- diabase.	
153	Cornon, Predazzo, Tyrol.	J. A. Ippen.	J. A. Ippen, N. J. Cb., 1903, p. 10.	Melaphyre.	
154	Cornon, Predazzo, Tyrol.	J. A. Ippen.	J. A. Ippen, N. J. Cb., 1903, p. 10.	Melaphyre.	
155	Auermadsattel, Salzkammergut, Tyrol.	C. v. John.	C. v. John, Jb. G. E.-A. Wien, XLIX, p. 256, 1899.	Diabase porphyrite.	In W. T., p. 285
156	Tarasp, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 237, 1909.	Diabase.	
157	Champatsch Alp, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 238, 1909.	Diabase.	
158	Champatsch Alp, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 234, 1909.	Diabase.	
159	Pazza, near Remus, Lower Engadine, Switzerland.	L. Hezner.	U. Grubenmann, Btr. G. Kt. Schw., XXIII, p. 235, 1909.	Diabase.	
160	Ardez, Lower Engadine, Switzerland.	O. Züst.	O. Züst, In. Diss. Zür., p. 35, 1905.	Diabase.	
161	Monte Paularo, Carnic Alps, Veneto.	M. Gortani.	M. Gortani, Mem. Soc. Tosc., XXII, p. 181, 1906.	Diabase.	
162	Gorgona Island, Tuscan Archipelago.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XX, p. 52, 1904.	Diabase.	
163	Matotschin Scharr, Nova Zembla.	A. Wichmann.	A. Wichmann, Z. D. G. G., XXXVIII, p. 527, 1886.	Diabase.	In W. T., p. 445.
164	Jalguba, Olonez, Russia.	L. Lessing.	L. Lessing, T. M. P. M., VI, p. 294, 1885.	Variolite.	In W. T., p. 283.
165	Jalguba, Olonez, Russia.	L. Lessing.	L. Lessing, T. M. P. M., VI, p. 294, 1885.	Variolite aphanite.	In W. T., p. 325.
166	Jalguba, Olonez, Russia.	L. Lessing.	L. Lessing, T. M. P. M., VI, p. 294, 1885.	Variolite.	In W. T., p. 453.
167	French Guinea.	Not stated.	Lemoine and Chantard, B. Soc. G. Fr. (4), VIII, p. 35, 1908.	Diabase.	
168	Konyam Bay, Siberia.	Lindstrom.	Lindstrom, Ref. N. J., 1885, I, p. 430.	Diabase aphanite.	Not fresh. In W. T., p. 443.
169	Jenissei River, Siberia.	J. P. Tolmatschew.	J. P. Tolmatschew, Ref. N. J., 1900, I, p. 388.	Variolite.	In W. T., p. 455.
170	Avericha River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 380, 1910.	Epidiabase.	Metamorphosed.
171	Angara River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 352, 1910.	Mica diabase.	MnO high?

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
172 A2. II	45.89	14.40	7.05	5.10	9.93	9.82	1.63	0.60	3.08		1.39		0.43	CO ₂ 1.19	100.51	
173 A3. III	45.78	19.36	5.17	6.62	7.64	9.32	1.98	2.04	1.34					CO ₂ 0.48	99.73	
174 A3. III	44.90	18.30	2.60	8.76	4.15	7.64	1.91	1.01	4.50		2.04		trace	CO ₂ 3.76	99.57	
175 A1. I	50.37	13.01	3.24	14.66	1.78	5.70	1.42	1.74	2.76	0.70	1.60	0.69	0.69	CO ₂ 1.16 Cl 0.02 F 0.03 B ₂ O ₃ 0.83 NiO 0.05 BaO 0.11 SrO none	100.56	
176 A3. III	48.21	16.01	1.12	6.94	8.29	7.68	4.23	0.51	5.86				0.90		99.75	2.74
177 A2. II	48.62	15.96	1.92	6.63	7.50	9.12	2.70	0.93	3.76		1.32	0.18		CO ₂ 0.95	99.59	
178 A2. II	47.15	14.36	4.52	4.87	8.52	7.89	3.53	1.38	4.75		1.09			CO ₂ 2.50	100.56	
179 A3. III	59.01	12.93	2.77	6.36	4.78	6.32	0.92	2.50	4.48			trace			(100.66)	2.596
180 A3. III	48.48	15.68	4.13	3.29	7.17	11.00	3.55	0.63	6.05						99.98	2.576
181 A3. III	47.03	16.10	5.55	3.03	7.08	9.60	3.79	0.98	7.16						100.32	2.404
182 A1. I	48.22	14.82	0.56	9.25	5.58	8.81	4.95	0.44	2.54	0.15	2.68	0.23		CO ₂ 1.40 FeS ₂ 0.37 Cr ₂ O ₃ none NiO 0.03 BaO none SrO trace	100.26	
183 A1. I	38.85	19.83	2.72	8.12	3.61	12.09	1.74	1.58	1.85	1.46	1.78	0.45	0.16	CO ₂ 6.17 SO ₃ none Cl none S none NiO 0.05	100.46	2.967
184 A3. III	53.09	16.03	4.36	1.73	3.36	5.16	8.09	0.03	0.98	0.05	0.98			CO ₂ 6.33 FeS ₂ 0.26	100.03	2.73
185 A3. III	47.70	9.99	1.60	7.33	22.49	0.69	0.43	0.38	6.62	0.21	0.52		1.38	CO ₂ 1.35	100.69	2.08
186 A4. IV	42.17	9.29	n. d.	8.18	24.71	4.06	0.45	0.26	2.97	0.02	0.55		0.55	CO ₂ 6.70	100.19	2.85
187 A2. II	45.36	13.78	1.74	11.54	6.23	8.07	1.71	0.33	4.47	0.22	1.69	0.26	0.17	CO ₂ 4.49 FeS ₂ 0.17	100.23	2.85
188 A2. II	41.00	12.61	0.63	8.08	15.25	11.12	1.85	1.46	4.19		1.12		0.41	CO ₂ 2.13 Cr ₂ O ₃ 0.10	99.95	
189 A2. II	39.30	14.04	2.40	9.22	5.29	8.24	2.18	1.03	4.26	1.02	4.34	0.20	0.12	CO ₂ 8.54 SO ₃ 0.20	100.38	
190 A2. II	49.16	15.27	8.64	7.22	8.34	5.26	2.72	0.61	0.98	0.44	0.48	trace	0.29	CO ₂ 0.71	100.12	2.70

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
172	Angara River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 345, 1910.	Olivine diabase.	
173	Angara River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 357, 1910.	Mica diabase.	
174	Tatarka River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 338, 1910.	Proterobase.	
175	Kusjkin Island, Siberia.	H. Backlund.	H. Backlund, Mem. Ac. Sci. St. P., XXI, No. 6, p. 29, 1910.	Diabase.	
176	Mount Dselola, Okhotsk, Siberia.	Not stated	K. E. Bogdanovitch, Fund. Marek., p. 56.	Diabase.	
177	Pe-Shan Massif, China.	M. Dittrich.	K. Futterer, Durch Asien, II (1), p. 332, 1905.	Diabase.	
178	Pe-Shan Massif, China.	C. Pfeil.	K. Futterer, Durch Asien, II (1), p. 339, 1905.	Diabase.	
179	Gunung Kerbau, Hiton, Ambon Island.	I. Balbareef.	R. D. M. Verbeek, Jb. Mijnw., XXXIV, p. 236, 1905.	Melaphyre.	French edition, p. 248.
180	Tandjoun Nousaniwi, Leitimor, Ambon Island.	J. S. Winarski.	R. D. M. Verbeek, Jb. Mijnw., XXXIV, p. 235, 1905.	Melaphyre.	French edition, p. 248.
181	Cape Nousaniwi, Leitimor, Ambon Island.	F. Jaronski.	R. D. M. Verbeek, Jb. Mijnw., XXXIV, p. 234, 1905.	Melaphyre.	French edition, p. 246.
182	Nundle, New South Wales.	W. N. Benson.	W. N. Benson, G. Mag. (V), X, p. 20, 1913.	Spillite.	
183	Bendigo, Victoria.	H. S. Whitelaw.	A. R. Secy. Min. Vict. (1911), p. 62, 1912.	Dike (diabase?).	
184	Leonora, Western Australia.	C. C. Williams.	C. F. V. Jackson, W. Aust. G. S. B. 13, p. 19, 1904.	"Greenstone" (diabase).	Altered.
185	Leonora, Western Australia.	C. C. Williams.	C. F. V. Jackson, W. Aust. G. S. B. 13, p. 19, 1904.	"Greenstone" (diabase).	Sp. gr. low?
186	Leonora, Western Australia.	C. C. Williams.	C. F. V. Jackson, W. Aust. G. S. B. 13, p. 19, 1904.	"Greenstone" (diabase).	
187	Bangemall, Gascoyne Goldfield, Western Australia.	Not stated.	J. A. Thompson, W. Aust. G. S. B. 33, p. 160, 1909.	Diabase.	
188	Waitaha River, Mikonui, New Zealand.	J. S. MacLaurin.	P. G. Morgan, G. S. N. Z. B. 6, p. 141, 1908.	Diabase.	
189	Moonlight Creek, Waiwhero, Reefton District, New Zealand.	Headerson.	P. G. Morgan, pers. com.	Diabase.	
190	Musgrave Peninsula, Carnley Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islds., II, p. 728, 1909.	Olivine diabase.	

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
191 A2. II	47.61	17.47	3.44	8.78	2.49	7.04	4.49	1.60	3.71	0.84	0.87	1.10	0.13	CO ₂ 0.28	99.85	2.68
192 B2. III	47.41	16.18	12.92	8.37	1.16	4.03	3.49	2.15	1.38	1.42	0.31	trace	0.27	CO ₂ 0.21	99.30	2.80

BASALT.

1 A1. I	31.42	11.57	2.37	7.48	5.32	16.71	2.26	0.74	4.17	0.76	2.30	0.46	0.38	CO ₂ 13.13 ZrO ₂ none FeS ₂ 0.16 Cr ₂ O ₃ trace V ₂ O ₅ 0.06 BaO 0.64 SrO none	99.93	
2 A2. II	47.52	13.91	7.06	3.76	6.84	5.71	3.06	0.77	4.55	1.75	1.19	0.15	0.18	CO ₂ 3.68 NiO trace BaO trace SrO trace	100.13	
3 A1. I	40.35	5.11	24.99	3.55	5.48	1.32	0.18	1.44	8.51	8.51	0.20		0.22	CO ₂ none SO ₃ none S none NiO none BaO none SrO none	99.86	
4 A2. II	47.20	15.36	3.06	8.87	4.20	5.05	4.72	1.40	3.04	0.16	3.30	0.36	0.20	CO ₂ 3.34 SO ₃ trace F trace S trace BaO trace SrO trace	100.26	
5 A2. II	44.29	17.46	3.82	10.35	7.03	8.68	2.19	0.71	4.11	0.21	1.40	0.20	trace	BaO none	100.45	
6 A2. II	49.13	9.05	3.57	5.05	17.21	5.68	2.01	2.24	3.50	0.84	0.42	0.38	0.15	Cr ₂ O ₃ 0.39 NiO trace BaO 0.05	99.67	
7 A2. II	46.90	10.17	1.22	5.17	20.98	6.20	1.16	2.04	4.38	1.04	0.41	0.44	0.10	Cr ₂ O ₃ 0.33	100.54	2.86
8 A1. I	48.47	16.07	4.12	7.47	5.96	4.84	2.43	1.41	4.63	2.30	1.51	0.44	0.23	FeS ₂ 0.24 NiO trace BaO 0.03 SrO trace Cu trace	100.15	
9 A1. I	47.70	15.30	5.93	4.85	7.31	11.83	2.46	0.61	0.34	0.10	1.45	0.29	0.46	CO ₂ 1.87 SO ₃ none Cl trace BaO 0.09 SrO 0.02	100.61	2.95
10 A2. II	46.74	16.86	6.44	4.13	6.18	11.90	3.13	0.50	0.89	1.24	1.04	0.56	0.23	CO ₂ 0.55	100.52	
11 A1. I	52.12	15.21	1.83	8.95	6.01	3.75	4.83	0.48	3.74	0.90	1.38	0.14	0.19	CO ₂ 0.09 ZrO ₂ none S trace Cr ₂ O ₃ none NiO 0.03 BaO trace SrO none	99.65	
12 A2. II	40.89	10.41	15.00	0.07	3.76	5.18	0.47	0.53	10.32	9.14	3.37	0.52	0.90	CO ₂ none S 0.03 V ₂ O ₅ 0.01	100.60	
13 A2. II	49.85	17.00	4.02	5.51	7.65	1.18	4.78	none	6.65	2.16	0.97	0.10	none	S 0.07 BaO trace	99.94	
14 A2. II	48.76	16.60	5.60	5.01	6.93	8.79	2.47	0.66	2.19	1.49	1.26	0.19		CO ₂ 0.42 BaO 0.10	100.37	2.78

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
191	Carnley Harbor, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islds., II, p. 736, 1909.	Porphyrite.	
192	Musgrave Peninsula, Carnley Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islds., II, p. 727, 1909.	Diabase.	

BASALT.

1	Castle Hill, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, U. S. G. S. B. 165, p. 124, 1900.	"Volcanic tuff" (basalt?).	Not in W. T.
2	South Britain, Connecticut.	W. F. Hillebrand.	W. H. Hobbs, U. S. G. S. A. R. 21, III, p. 77, 1901.	Olivine basalt.	Weathered. In W. T., p. 447.
3	Holyoke, Massachusetts.	G. Steiger.	B. K. Emerson, B. G. S. A., XVI, p. 112, 1905.	Palagonite.	Blebs in No. 13, p. 866.
4	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, U. S. G. S. Mon. 36, p. 106, 1899.	Metabasalt.	In W. T., p. 447.
5	Mansfield, Crystal Falls, Michigan.	G. Steiger.	C. R. Van Hise, U. S. G. S. B. 168, p. 68, 1900.	Metadolerite.	In W. T., p. 331.
6	Bear Creek, Madison Valley, Montana.	T. M. Chatard.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 641, 1895.	Basalt.	In W. T., p. 313.
7	Fort Ellis, near Bozeman, Montana.	T. M. Chatard.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 640, 1895.	Basalt.	In W. T., p. 317.
8	Black Jack Mine, Silver City, Idaho.	W. F. Hillebrand.	W. Lindgren, U. S. G. S. A. R. 20, III, p. 176, 1900.	Basalt.	In W. T., p. 319.
9	Cedar Ranch Mesa, San Francisco Mountains, Arizona.	H. H. Robinson.	H. H. Robinson, U. S. G. S. P. P. 76, p. 150, 1913.	Basalt.	
10	Little Ash Creek, Bradshaw Mountains, Arizona.	G. Steiger.	Jaggard and Palache, U. S. G. S. Fol. 126, p. 7, 1905.	Basalt.	
11	Johnson Creek, Port Orford quadrangle, Oregon.	W. F. Hillebrand.	J. S. Diller, U. S. G. S. Fol. 89, p. 4, 1903.	Basalt.	
12	Near Portland, Oregon.	G. Steiger.	J. S. Diller, U. S. G. S. B. 260, p. 345, 1905.	Basalt glass.	
13	Bully Hill Mine, Shasta County, California.	E. T. Allen.	J. S. Diller, U. S. G. S. B. 213, p. 127, 1903.	Metabasalt.	Wall of ore body.
14	Dardanelles, Stanislaus County, California.	G. Steiger.	F. L. Ransome, U. S. G. S. B. 89, p. 58, 1898.	Olivine basalt.	In W. T., p. 289.

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
15 A2. II	59.72	14.63	3.40	2.37	2.69	6.55	3.28	3.33	1.38	0.72	0.95	0.40	0.10	CO ₂ 1.12 BaO 0.04	100.68	
16 A2. II	48.59	17.80	8.70	0.93	4.85	10.49	3.06	1.70	0.67	0.76	1.54	0.43	0.14	CO ₂ 0.55	100.21	
17 A2. II	48.20	21.47	5.89	2.20	3.33	10.60	3.10	1.33	1.20	0.96	1.34	0.39	0.11	CO ₂ 0.38	100.50	
18 A2. II	64.16	14.42	2.72	2.65	1.35	3.24	4.42	2.42	1.49	0.47	0.94	0.23	0.11	CO ₂ 1.58	100.20	
19 A2. II	43.88	17.96	4.07	6.69	5.33	7.66	3.62	1.37	1.38	0.50	0.33		0.29	CO ₂ 6.34 F 0.04 S 0.12	99.58	
20 A1. I	51.37	13.27	5.12	7.59	2.83	6.83	3.58	1.85	2.28		3.09	0.43	trace	CO ₂ 1.80 Cl 0.03 S trace NiO 0.02 BaO 0.26 SrO 0.02	100.37	
21 A1. I	45.26	15.28	4.53	8.12	5.15	9.57	2.98	1.18	1.28		3.46	0.59	0.40	CO ₂ 2.90 SO ₃ trace NiO trace BaO 0.06 SrO 0.02	100.78	
22 A1. I	47.36	12.47	2.64	10.03	6.97	9.70	2.50	1.08	1.59	0.10	2.02	0.30	0.14	CO ₂ 3.21 S none NiO 0.07 BaO none SrO none	100.18	
23 A2. II	45.24	15.63	5.56	7.19	7.88	9.38	2.01	0.72	2.21	1.12	2.26	0.20	0.23	CO ₂ 0.49 Cr ₂ O ₃ trace NiO trace	100.61	2.85
24 A1. I	44.60	12.83	4.65	8.26	6.43	10.95	2.59	0.31	0.70	1.33	1.84	0.20	0.37	CO ₂ 5.39 S 0.24 Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.04 NiO 0.04 BaO none	100.80	
25 A2. II	45.24	17.08	1.84	8.02	5.74	4.64	5.32	0.13	5.66		2.40	0.57	0.14	CO ₂ 2.98	99.76	2.62
26 A3. III	53.41	11.52	8.36	3.38	2.63	13.16	0.71	0.63	3.56	1.54			1.48		100.38	2.743
27 A3. III	51.31	14.55	n. d.	9.02	6.85	11.61	1.79	0.60	1.14		1.00		0.47	CO ₂ 1.47	99.81	2.880
28 A3. III	38.06	16.38	6.97	n. d.	0.87	20.42	1.95	0.56	2.31		0.96		0.84	CO ₂ 10.37 SO ₃ 0.13	99.82	
29 A3. III	51.10	16.75	n. d.	8.05	5.89	11.97	2.02	0.66	1.16		0.96		0.37	CO ₂ 1.20	100.11	2.859
30 A3. III	55.19	12.30	10.23	n. d.	4.12	7.53	2.13	1.30	1.55		1.03		0.63	CO ₂ 3.64	99.65	2.60
31 A1. I	49.80	16.24	3.85	5.31	4.52	4.01	4.88	2.51	2.43	1.08	1.73	0.18	0.27	CO ₂ 3.22 NiO 0.02 BaO 0.02 Li ₂ O trace	100.07	
32 A3. III	47.45	17.54	2.05	7.44	6.72	10.97	3.93	trace	2.67	0.24	trace		trace	CO ₂ 0.54	99.55	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
15	Black Peak, Bullfrog District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. B. 407, p. 56, 1910.	Quartz basalt.	
16	Near Black Butte, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 73, 1909.	Mica dolerite.	
17	Rabbit Spring, Goldfield District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. P. P. 66, p. 73, 1909.	Olivine dolerite.	
18	Bejuca, Panama.	W. C. Wheeler.	D. F. MacDonald, U. S. G. S. rec. lab.	Basaltic rock.	
19	Theotomio, Madeira River, Amazonas, Brazil.	G. S. Blake.	J. W. Evans, Q. J. G. S., LXII, p. 111, 1906.	Olivine basalt.	
20	Dalmahoy Hill, n. Edinburgh, Scotland.	Harrison and Reid.	J. B. Harrison, pers. com.	Dolerite.	
21	Salisbury Crags, n. Edinburgh, Scotland.	Harrison and Reid.	J. B. Harrison, pers. com.	Dolerite.	
22	Glen Dilbidale, Ross, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem., sh. 93, p. 102, 1912.	Amphibolite (metamorphosed dolerite).	
23	Ben Lee, Skye, Scotland.	W. Pollard.	A. Harker, Rocks of Skye, p. 248, 1904.	Olivine dolerite.	
24	Kildonan, Eigg, Scotland.	W. Pollard.	A. Harker, G. S. Scot. Mem., sh. 45, p. 166, 1908.	Dolerite.	
25	Victoria Park, Glasgow, Scotland.	P. Holland.	F. Rutley, Q. J. G. S., XLV, p. 631, 1889.	Tachylite.	In W. T., p. 449.
26	Pontesford Hill, Shropshire, England.	C. F. Baker.	W. S. Boulton, Q. J. G. S., LX, p. 469, 1904.	Palagonite tuff.	MnO high?
27	Crookdene Dike, Northumberland, England.	Heslop and Smythe.	Heslop and Smythe, Q. J. G. S., LXVI, p. 3, 1910.	Basalt.	
28	Crookdene, Northumberland, England.	Heslop and Smythe.	Heslop and Smythe, Q. J. G. S., LXVI, p. 6, 1910.	Basalt.	Weathered.
29	Collywell Dike, Northumberland, England.	Heslop and Smythe.	Heslop and Smythe, Q. J. G. S., LXVI, p. 3, 1910.	Basalt.	
30	Cleveland Dike, River Tees, England.	Not stated.	Heslop and Burton, G. Mag. (V), IX, p. 61, 1912.	Tachylite.	
31	Marloes, Pembrokeshire, Wales.	E. G. Radley.	H. H. Thomas, Q. J. G. S., LXVII, p. 200, 1911.	Marloesite.	
32	Bryn Llwyd, Anglesey, Wales.	J. O. Hughes.	A. Harker, Rep. B. A. A. S., p. 165, 1909.	Dolerite.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
33 A3. III	49.80	17.94	2.37	6.74	4.02	9.00	4.03	0.20	3.54	0.10	1.70			CO ₂ 1.28	100.72	
34 A3. III	42.52	18.10	7.50	4.12	8.55	6.07	4.33	0.56	6.86		0.89			CO ₂ trace	99.50	2.94
35 A3. III	37.97	19.45	7.85	2.95	4.58	18.25	2.90	trace	2.71		0.92			CO ₂ 2.58	100.16	3.01
36 A2. II	40.81	13.08	6.40	7.20	10.03	10.12	2.43	0.31	3.97	0.82	3.86	0.88	0.07		99.98	
37 A3. III	46.70	13.74	5.43	9.86	6.24	3.95	3.48	1.36	5.88		1.94		trace	CO ₂ 1.68	100.26	2.62
38 A1. I	44.31	14.87	8.43	2.85	6.06	10.96	3.46	0.71	3.82		3.74	0.79	0.14	SO ₂ 0.07 Cr ₂ O ₃ 0.04 V ₂ O ₅ 0.08 BaO 0.06	100.27	
39 A3. III	49.50	14.50	10.03	1.80	4.15	7.44	3.85	1.01	4.55		2.85				99.68	
40 B3. IV	46.25	17.70	0.48	8.50	6.29	7.53	3.82	2.80	3.65		2.62			CO ₂ 1.45	101.09	
41 A3. III	45.90	16.81	trace	10.40	7.23	8.91	3.07	0.39	3.65		2.46	0.07		CO ₂ 0.60	99.49	
42 B3. IV	46.82	14.31	11.11	1.92	7.50	9.03	4.43	2.22	0.16			1.85			99.35	
43 A3. III	46.46	18.70	6.72	3.35	5.85	9.72	2.55	1.36	4.13			0.65			99.49	
44 A2. II	52.16	15.86	4.90	5.86	4.57	8.16	3.67	0.88	2.28		0.32	0.24		CO ₂ 1.38 SO ₂ 0.21 org. 0.05	100.54	2.764
45 A2. II	50.74	15.89	7.88	1.75	4.59	8.97	3.27	1.30	3.25		1.37	0.44		CO ₂ 0.14 SO ₂ 0.13	99.72	2.742
46 A2. II	45.63	13.92	3.06	9.02	11.45	10.49	1.76	0.11	0.79	0.78	2.00	0.81		CO ₂ 0.77 SO ₂ none	100.65	
47 A3. III	44.64	13.97	5.69	5.75	9.78	11.50	2.99	0.43	4.22		1.80				100.77	
48 A2. II	44.55	16.96	3.46	6.22	9.44	8.29	2.38	1.54	2.46	2.00	1.74	0.31		CO ₂ 0.57 SO ₂ none	99.92	
49 A3. III	44.25	13.99	1.39	9.44	8.39	11.49	2.71	1.02	5.17	0.49	1.44				99.78	
50 A2. II	43.60	11.39	7.70	5.71	10.46	10.10	2.59	1.61	3.14	1.31	2.03	0.77		SO ₂ 0.31	100.72	
51 A2. II	43.30	12.67	1.69	8.86	14.16	10.34	2.69	1.43	0.97	0.28	2.31	0.68		CO ₂ 0.70 SO ₂ 0.01	100.09	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
33	Kilbride, County Mayo, Ireland.	J. Weintraube.	Gardiner and Reynolds, Q. J. G. S., LXVIII, p. 96, 1912.	Spillite.	
34	Roundwood, County Wicklow, Ireland.	Not stated.	W. J. Sollas, Pr. R. Dub. Soc., VIII, p. 106, 1893.	Variolite.	Not in W. T.
35	Roundwood, County Wicklow, Ireland.	Not stated.	W. J. Sollas, Pr. R. Dub. Soc., VIII, p. 106, 1893.	Variolite.	Not in W. T.
36	Rathjordan, County Limerick, Ireland.	G. T. Prior.	G. T. Prior, Min. Mag., XV, p. 317, 1910.	Analcite basalt.	
37	Scarlett Stack, Isle of Man.	P. Holland.	Dickson and Holland. Pr. Liv. G. Soc., VI, p. 128, 1889.	Basalt.	Not in W. T.
38	Gergovie, Auvergne.	P. Holland.	Dickson and Holland, Pr. Liv. G. Soc., VIII, p. 412, 1899.	Basalt.	Not in W. T.
39	Cogolin, Esterel, France.	Pisani.	A. Michel-Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 41, 1912.	Basalt.	
40	Pic du Midi, Pyrenees.	Pisani.	A. de Romeu, B. Soc. M. Fr., XXX, p. 164, 1907.	Labradorite.	
41	Col d'Oncet, Pyrenees.	Pisani.	A. de Romeu, B. Soc. M. Fr., XXX, p. 164, 1907.	Labradorite.	
42	Puig Arigas Rojas, San Feliu de Pallares, Catalonia.	Fages.	L. Fernandez-Navarro, Mem. Soc. Esp. H. N., IV, No. 5, p. 410, 1907.	Basalt scoria.	
43	Mallorquinas, near Olot, Catalonia.	Fages.	L. Fernandez-Navarro, Mem. Soc. Esp. H. N., IV, No. 5, p. 410, 1907.	Basalt.	Altered.
44	Kyrburg, near Kirn, Nahethal, Rheinland.	Bärwald.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 309, 1892.	Basalt.	In W. T., p. 285.
45	Tiefert, near Kirn, Nahethal, Rheinland.	Bärwald.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 309, 1892.	Navite.	In W. T., p. 281.
46	Wartfeld, Giessen, Hesse.	F. Heiberger.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 458, 1908.	Basalt.	
47	Albacher Hof, Giessen, Hesse.	A. Streng.	A. Streng, Ber. Oberhes. Ges., XXIX, p. 99, 1893.	Basalt.	In W. T., p. 327.
48	Dreihausen, Giessen, Hesse.	G. Butzbach.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 460, 1908.	Basalt.	
49	Steinberg, Giessen, Hesse.	A. Streng.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 458, 1908.	Basalt.	
50	Garbenteich, Giessen, Hesse.	W. Sonne.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 462, 1908.	Basalt.	
51	Hohe Warte, Giessen, Hesse.	K. M. Jene.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 458, 1908.	Basalt.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
52 A2. II	42.78	13.90	6.34	5.26	8.90	10.91	3.09	0.51	2.74	1.60	2.98	0.78		CO ₂ 0.23 SO ₃ 0.09	100.11	
53 A2. II	42.53	11.64	4.18	7.84	13.70	9.72	1.87	1.63	1.38	1.05	2.57	0.85		CO ₂ 0.64 SO ₃ 0.24	99.84	
54 A2. II	42.25	13.57	5.11	5.86	10.05	12.46	3.00	0.65	1.38	1.42	1.55	0.88		CO ₂ 1.86 SO ₃ 0.13	100.17	
55 A2. II	41.73	13.15	8.68	3.44	8.80	12.05	3.19	1.02	5.18	0.60	1.89	0.53		SO ₃ 0.15	100.41	
56 A2. II	40.83	14.74	4.33	7.92	10.81	10.07	3.70	2.42	0.20	0.18	2.00	1.04		CO ₂ 1.31 SO ₃ 0.19	99.74	
57 A3. III	42.17	10.81	9.20	6.52	11.85	13.55	3.36	1.11	0.35		1.16				100.08	
58 A3. III	41.81	10.90	9.97	6.34	11.67	13.45	3.28	1.03	0.32		1.18				99.95	
59 A2. II	41.32	10.95	15.13	7.36	3.56	10.33	4.19	0.85	4.38		0.35	0.97		CO ₂ 0.20	99.59	
60 A2. II	53.60	14.43	1.62	8.70	0.41	8.00	5.61	2.03	2.02		1.98	0.16		CO ₂ 0.52 X 0.93 SO ₃ 0.15	100.16	
61 A3. III	44.22	19.54	2.27	4.33	6.96	9.02	2.46	3.84	5.60		trace	trace	0.12	SO ₃ 1.36	99.72	
62 A2. II	43.19	19.43	9.67	2.45	3.43	11.48	3.93	1.25	3.49	0.67	0.14	0.43		SO ₂ trace Cl trace	99.56	2.858
63 A3. III	43.10	15.70	12.90	2.91	7.15	10.90	1.05	0.36	4.50		1.70	none			100.27	
64 A3. III	42.21	13.82	10.79	2.73	9.34	13.16	2.16	0.34	3.14		2.48				100.17	
65 A2. II	49.29	17.95	2.97	5.31	2.75	5.42	6.01	3.16	3.48	0.20	2.10	0.87		CO ₂ 0.16 SO ₃ 0.32	99.99	2.69
66 A2. II	47.67	14.83	5.01	6.34	5.50	9.31	3.49	1.57	1.91		2.56	0.20	0.08	CO ₂ 0.83 X 0.66 SO ₃ 0.05 Cl 0.15	100.16	2.994
67 A2. II	44.78	12.76	5.42	8.34	10.17	10.23	3.56	1.81	1.42		0.25	0.92		CO ₂ 0.93 SO ₂ trace	100.89	2.952
68 A2. II	37.62	9.86	4.22	5.94	8.41	15.42	3.33	2.32	4.41		2.79	2.05		CO ₂ 3.55 SO ₃ 0.80 Cl 0.03 S 0.06	100.84	
69 A2. II	36.87	10.54	7.38	7.24	11.90	13.78	1.07	0.73	6.02		3.16	0.96		CO ₂ 0.44 SO ₃ trace S 0.13	100.22	
70 A2. II	54.19	16.28	5.08	3.46	2.98	6.34	4.05	1.98	3.67		1.56	0.43		CO ₂ 0.07 SO ₃ 0.14	100.23	2.656
71 A2. II	44.69	16.18	4.88	6.93	6.52	10.41	3.58	2.66	2.41		1.00	0.56	0.22	CO ₂ 0.49 SO ₃ 0.33	100.86	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
52	Haardt, near Lich, Giessen, Hesse.	L. Walther.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 454, 1908.	Basalt.	
53	Winnen, Giessen, Hesse.	G. Butzbach.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 460, 1908.	Basalt.	
54	Altenbusick, Giessen, Hesse.	G. Butzbach.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 454, 1908.	Basanitic basalt.	
55	Hundsköphel, Giessen, Hesse.	L. Walther.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 454, 1908.	Basalt.	
56	Lollarer Kopf, Giessen, Hesse.	G. Butzbach.	W. Schottler, Abh. G. L.-A. Hes., IV, p. 454, 1908.	Basalt.	
57	Birstein, Vogel Gebirge, Hesse.	Hauser.	F. Tannhäuser, Bautech. Gest. Unt., I (1), p. 41, 1910.	Basalt.	Weathered.
58	Birstein, Vogel Gebirge, Hesse.	Hauser.	F. Tannhäuser, Bautech. Gest. Unt., I, (1), p. 41, 1910.	Basalt.	Weathered.
59	Gedern, Vogel Gebirge, Hesse.	J. M. Ledroit.	J. M. Ledroit, Ber. Oberh. Ges., XXIV, p. 152, 1886.	Basalt.	In W. T., p. 315.
60	Gottsbüren, Reinhardswald, Hesse.	P. Jannasch.	F. Rinne, Jb. Pr. G. L.-A., XIII, p. 78, 1893.	Basalt.	In W. T., p. 263.
61	Urberach, Häsegebirge, Hesse.	Kutscher and Rudolph.	C. Chelius, Nb. Ver. Erdk., IV, p. 12, 1891.	Basalt.	In W. T., p. 301.
62	Spreudlingen, near Frankfurt, Hesse.	Not stated.	C. Chelius, Nb. Ver. Erdk., XIV, p. 1, 1893.	Hornblende basalt.	In W. T., p. 301.
63	Seigertshausen, Knüll District, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 37.	Basalt.	
64	Predigtstuhl, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., 1910, p. 494.	Basalt.	
65	Oberberg, near Wissenbach, Hesse-Nassau.	F. Stadler.	R. Brauns, N. J. B. B., XXVII, p. 272, 1909.	Basalt.	
66	Hirzstein, Habichtswald, Hesse-Nassau.	O. Fromm.	O. Fromm, Z. D. G. G., XLIII, p. 70, 1891.	Basalt.	
67	Hünenburg, Prussia.	G. F. Steffen.	F. Beyschlag, Erl. G. Kt. Pr., Bl. Melsungen, p. 20, 1891.	Basalt.	In W. T., p. 345.
68	Petersberg, Fränkische Alp, Bavaria.	Not stated.	C. W. Gümbel, Geog. Besch. Fränk. Alps, p. 569, 1891.	Basalt.	In W. T., p. 361.
69	Krummhübel, Riesengebirge.	Eyme.	Berg, Z. D. G. G., LXV, p. 205, 1913.	Glass basalt.	
70	Idarthal, St. Wendel, Harz.	Bärwald.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 316, 1892.	Basalt.	In W. T., p. 283.
71	Wesseln, Polzen District, Bohemia.	K. H. Scheumann.	K. H. Scheumann, Abh. Sachs. Ges. W., XXXII, p. 758, 1913.	Hauyne basalt.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
72 A2. II	43.62	15.45	4.94	6.65	7.56	9.63	3.91	2.54	2.25		1.02	0.83	0.40	CO ₂ SO ₃ Cl	0.75 0.32 trace	99.87	
73 A3. III	41.84	17.51	12.77	3.71	3.63	11.16	3.45	0.82	3.56			0.50		CO ₂ SO ₃	0.88 trace	99.83	
74 A2. II	48.67	14.15	9.07	0.83	6.36	6.16	1.61	0.96	9.39		1.99	0.36				99.55	
75 A2. II	48.38	12.76	8.91	4.83	6.23	7.65	1.13	1.67	6.00		2.07	0.64				100.27	
76 B2. III	49.06	16.61	4.94	5.97	4.80	8.31	3.53	0.60	1.01		2.24	0.66	0.59	CO ₂	0.94	99.26	
77 A3. III	50.53	9.49	9.03	2.12	12.13	4.68	4.91	0.62	5.22		0.32	trace	trace	CO ₂	1.05	100.10	2.717
78 A2. II	47.05	14.68	9.36	2.43	6.52	9.22	7.31	1.43	0.79		1.10	0.02	0.12	CO ₂	trace	100.03	2.739
79 A3. III	47.43	17.20	4.20	5.27	4.85	7.56	3.53	1.51	2.42	3.12	3.00			CO ₂	none	100.09	
80 A3. III	39.00	15.58	6.13	3.11	6.55	6.82	3.22	0.59	6.03	8.18	2.59			CO ₂	1.83	99.63	
81 A3. III	35.48	8.30	12.30	14.60	7.10	1.04	3.92	trace	16.80		none					99.54	
82 A2. II	52.37	17.42	5.58	3.22	3.84	6.66	5.51	0.67	1.85	1.74	1.05	0.34	0.14	CO ₂	0.28	100.67	
83 A2. II	56.58	14.88	2.31	3.04	3.76	8.69	3.36	2.18	1.43	0.69	0.77	0.15	0.16	CO ₂ BaO	2.32 0.07	100.39	
84 A2. II	48.12	16.21	2.94	7.56	7.24	8.71	2.91	1.44	1.72		1.58	0.60	trace	CO ₂	0.84	99.87	
85 A2. II	44.08	13.12	3.50	6.68	8.90	14.05	1.57	1.56	1.86	0.52	2.12	0.36		CO ₂	1.87	100.19	
86 B2. III	34.39	13.05	5.20	0.98	8.62	18.52	2.56	0.24	3.72	2.22	0.63		trace	CO ₂ S CuO	10.89 none 0.07	101.09	
87 A3. III	50.40	19.84	5.97	3.16	3.82	8.56	3.15	1.08	3.52				trace			99.50	2.72
88 A3. III	48.48	19.19	4.29	3.62	7.39	8.94	3.06	0.89	4.19				trace			100.90	
89 A3. III	48.82	14.10	2.75	8.73	4.25	5.50	4.00	1.76	4.50		5.12					99.53	
90 A2. II	44.85	11.76	5.20	8.10	4.07	9.03	2.92	1.70	7.40		4.37	0.39				99.79	
91 A4. III	23.20	4.92	0.55	4.03	3.53	0.88	0.48	0.30	4.80					CaCO ₃	55.85	99.46	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
72	Wesseln, Polzen District, Bohemia.	K. H. Scheumann.	K. H. Scheumann, Abh. Sachs. Ges. W., XXXII, p. 758, 1913.	Hauyne basalt.	
73	Chlumek, near Pschan Mittelgebirge, Bohemia.	J. Hanaman.	J. Hanaman, Arch. Landdf. Böhm., VII (3), p. 66, 1890.	Basalt.	3 places. Not in W. T.
74	Szentgyorgyhegy, Zala, Hungary.	K. Emszt.	K. Emszt, Jb. Ung. G. A. (1904), p. 339, 1906.	Basalt tuff.	3 places.
75	Szentgyorgyhegy, Zala, Hungary.	K. Emszt.	K. Emszt, Jb. Ung. G. A. (1904), p. 339, 1906.	Basalt tuff.	3 places.
76	Monte Venda, Euganeau Hills, Italy.	M. Stark.	M. Stark. T. M. P. M., XXV, p. 329, 1906.	Basalt.	
77	Palagonia, Val di Noto, Sicily.	G. Ponte.	G. Ponte, Att. Ac. Gioen. (5), III, No. X, p. 7, 1910.	Basalt glass.	From palagonite. Cf. No. 2, III. 6.2.5.
78	Monte Lauro, Val di Noto, Sicily.	S. Mariscalco.	S. Mariscalco, Att. Ac. Gioen. (5), VII, No. IX, p. 6, 1913.	Basalt.	
79	Monte Levante, Linosa Island.	H. S. Washington.	H. S. Washington, J. G., XVI, p. 29, 1908.	Basalt tuff.	
80	Monte Pozzolana, Linosa Island.	H. S. Washington.	H. S. Washington, J. G., XVI, p. 29, 1908.	Basalt tuff.	
81	Franz Joseph Land.	J. J. H. Teall.	J. J. H. Teall, G. Mag., XXXIV, p. 554, 1897.	Palagonite.	In W. T., p. 453.
82	Balaklava, Crimea.	I. A. Bagasheff.	W. W. Arschinow, Geol. Crim., p. 11, 1910.	Basalt tuff.	
83	Mytilene, Mytilene Island, Aegean Sea.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 79, p. 29, 1891.	Quartz basalt.	In W. T., p. 245.
84	Mao Manduku, Adamawa, Kamerun.	M. Dittrich.	W. Edlinger, In. Diss. Erl., p. 82, 1908.	Dolerite.	
85	Aukarana, Madagascar.	Boiteau.	A. Lacroix, pers. com.	Basalt.	
86	Copper Island, Commander Islands, Bering Sea.	W. Staronka.	J. Morozewicz, Com. C. Russ., Mem. 72, p. 73, 1913.	Basalt tuff.	
87	Cape Okesyn, Kamchatka.	Not stated.	K. Bogdanovitsch, Pet. Mt., L, p. 196, 1904.	Basalt.	
88	Mount Krasnaja, Tigil River, Kamchatka.	Not stated.	K. Bogdanovitch, Pet. Mt., L, p. 124, 1904.	Basalt.	
89	Tou-mou-nyi, Yunnan, China.	Pisani.	J. Deprat, Mem. Sv. G. Indo-Ch., I (1), p. 234, 1912.	Andesitic basalt.	
90	Tsouen-tien-po, Yunnan, China.	Pisani.	J. Deprat, Mem. Sv. G. Indo-Ch., I (1), p. 232, 1912.	Basalt.	
91	Wou-long, Yunnan, China.	Pisani.	J. Deprat, Mem. Sv. G. Indo-Ch., I (1), p. 235, 1912.	Basalt tuff.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
92 A3. III	58.35	16.70	4.08	3.28	3.29	7.71	2.62	2.87	1.08	0.08					100.06	
93 A2. II	43.70	14.98	5.38	5.44	7.45	9.64	3.02	2.38	5.27		2.15	0.66	0.06	CO ₂ trace SO ₃ 0.11 Cu trace	100.24	2.98
94 A1. I	54.88	12.62	3.02	7.11	3.73	4.16	6.01	1.10	1.76	0.23	3.63		0.25	CO ₂ trace ZrO ₂ 0.44 FeS ₂ 0.71 Cr ₂ O ₃ none NiO 0.05 BaO none	99.70	
95 A1. I	53.17	9.36	1.29	9.62	9.00	7.46	4.26	0.48	1.80	0.07	1.85	0.12	0.19	CO ₂ 1.17 FeS ₂ 0.30 Cr ₂ O ₃ none NiO 0.04 BaO none	100.18	
96 A1. I	52.48	17.03	2.10	6.48	2.21	5.22	4.31	3.10	1.92	0.88	1.12	0.61	0.02	CO ₂ 2.21 ZrO ₂ trace SO ₃ 0.13 Cl none S none Cr ₂ O ₃ none V ₂ O ₅ 0.01 NiO none BaO 0.07 SrO trace	99.90	2.715
97 A1. I	51.38	15.18	7.30	3.06	4.03	7.07	3.10	3.53	2.56	0.87	0.90	0.61	0.09	CO ₂ 0.46 ZrO ₂ none SO ₃ 0.03 Cl 0.05 S none Cr ₂ O ₃ none V ₂ O ₅ 0.01 NiO none BaO 0.07 SrO trace Li ₂ O none	100.30	2.77
98 A3. III	51.16	17.98	2.85	4.09	4.10	7.30	3.92	1.61	2.32	2.51	1.27	none		CO ₂ 1.03	100.14	
99 A1. I	50.54	12.77	2.50	8.01	5.89	9.24	3.33	0.57	1.96	1.24	1.80	0.23	0.11	CO ₂ 2.07 ZrO ₂ none SO ₃ none Cl none S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.01 NiO none BaO none SrO trace Li ₂ O none	100.31	2.808
100 A1. I	44.70	17.28	2.10	9.63	8.24	9.24	2.28	1.31	2.83	1.21	0.56	0.45	0.10	CO ₂ 0.11 ZrO ₂ 0.08 SO ₃ none Cl trace S none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.01 NiO 0.02 BaO 0.02 SrO trace Li ₂ O none	100.22	2.876
101 A1. I	50.43	14.72	2.90	4.59	6.67	7.13	2.47	1.23	3.49	3.82	0.82	0.22	0.03	CO ₂ 1.67 ZrO ₂ trace SO ₃ 0.01 Cl trace F none S none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.03 NiO none BaO none SrO trace Li ₂ O none	100.25	2.587
102 A1. I	49.10	16.11	0.60	10.62	7.43	11.76	1.04	1.06	0.50	0.20	1.20	0.09	0.21	CO ₂ 0.16 ZrO ₂ none SO ₃ none Cl 0.21 S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.03 NiO 0.02 BaO none SrO trace Cu trace ZnS 0.03	100.39	3.124

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
92	Antamok River, Benguet, Luzon, Philippine Islands.	P. J. Fox.	A. J. Eveland, Phil. J. Sci. (A), II, p. 226, 1907.	Basalt.	Altered. Cf. Ref., p. 251.
93	Mas River, Timor Island.	O. Pufahl.	A. Wichman, Gest. Timor, p. 128, 1887.	Basalt.	In W. T., p. 325.
94	Hanging Rock, Nunale, New South Wales.	W. N. Benson.	W. N. Benson, Pr. Linn. Soc. N. S. W., XXXVIII, p. 704, 1914.	Albitized dolerite.	Anal. corr. by W. N. B., pers. com.
95	Bingara, New South Wales.	W. N. Benson.	W. N. Benson, G. Mag. (V), X, p. 20, 1913.	Albite dolerite.	Anal. corr. by W. N. B., pers. com.
96	Dubbo, New South Wales.	J. C. H. Mingaye.	Dep. Min., N. S. W. A. R. (1905), p. 165, 1906.	Dolerite.	
97	Durras, New South Wales.	W. E. Stone.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Basalt.	
98	Staggy Creek, New South Wales.	L. A. Cotton.	W. N. Benson, pers. com.	Quartz dolerite.	
99	Rob Roy Gully, Inverell, New South Wales.	Not stated.	Dep. Min. N. S. W. A. R. (1908), p. 184, 1909.	Olivine basalt.	
100	Byron, Inverell, New South Wales.	Not stated.	Dep. Min. N. S. W. A. R. (1908), p. 184, 1909.	Olivine basalt.	Cf. No. 51, III.6.3.4.
101	Oakey Creek, Copetown, New South Wales.	J. C. H. Mingaye.	G. W. Card, Rec. G. S. N. S. W. VIII, p. 264, 1907.	Dolerite.	Altered. Diamond bearing.
102	Broken Hill, New South Wales.	J. C. H. Mingaye.	D. Mawson, Mem. R. Soc. S. Aust., II (4), p. 269, 1912.	Uralite dolerite.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
103 A2. II	48.30	17.94	3.23	5.82	2.78	8.09	3.85	2.30	2.36	1.76	2.64	0.56	0.20	CO ₂ 0.71 NiO 0.03 SrO trace	100.60	
104 A1. I	45.88	17.16	3.03	7.57	6.26	7.20	4.08	1.78	3.17	0.88	2.24	0.19	0.24	CO ₂ 0.60 SO ₃ 0.09 Cl 0.02 Cr ₂ O ₃ 0.01 V ₂ O ₃ 0.03 NiO 0.05 BaO 0.13 SrO trace	100.61	2.898
105 A1. I	43.06	16.31	5.40	7.61	5.49	9.37	3.12	1.07	2.93	1.16	2.46	0.32	0.23	CO ₂ 1.36 Cl 0.02 FeS ₂ 0.26 V ₂ O ₃ 0.05 NiO 0.06 BaO 0.02 SrO trace	100.30	2.814
106 A1. I	42.48	14.70	3.96	9.24	9.15	9.98	3.13	1.99	1.34	0.14	2.38	none	0.11	CO ₂ 0.94 ZrO ₂ none SO ₃ 0.10 Cl 0.02 Cr ₂ O ₃ 0.01 V ₂ O ₃ 0.02 NiO 0.06 CoO trace BaO 0.12 SrO trace CuO 0.01	100.27	3.027
107 A1. I	41.62	15.49	3.41	9.38	10.47	9.74	2.68	1.86	2.16	0.34	1.88	0.23	0.08	CO ₂ 0.56 ZrO ₂ none SO ₃ 0.04 Cl 0.02 Cr ₂ O ₃ trace V ₂ O ₃ 0.02 NiO 0.03 BaO 0.22 SrO trace Li ₂ O none	100.28	
108 A1. I	38.12	14.11	3.58	7.43	6.91	11.40	2.23	1.16	2.71	0.58	1.12	0.40	0.18	CO ₂ 9.60 SO ₃ 0.21 Cl trace Cr ₂ O ₃ 0.01 V ₂ O ₃ 0.02 NiO none CoO none BaO 0.07 SrO trace Li ₂ O none	99.87	2.903
109 A1. I	47.32	16.99	4.30	5.76	5.73	7.98	3.07	1.22	2.71	1.49	1.70	0.42	0.29	CO ₂ 1.21 ZrO ₂ none SO ₃ none Cl 0.06 S none Cr ₂ O ₃ trace V ₂ O ₃ 0.02 NiO 0.02 BaO 0.06 SrO trace Cu none	100.35	2.765
110 A1. I	45.60	11.62	2.80	9.18	10.41	8.46	2.58	1.88	3.32	0.76	1.85	0.41	0.14	CO ₂ 1.01 ZrO ₂ none SO ₃ none Cr ₂ O ₃ none V ₂ O ₃ 0.02 NiO none BaO none SrO none Li ₂ O none	100.04	2.933
111 A1. I	46.88	18.32	2.50	7.91	5.36	8.46	2.96	1.47	1.96	0.78	2.30	0.64	0.01	CO ₂ 0.62 ZrO ₂ none SO ₃ 0.02 Cl trace S none Cr ₂ O ₃ none V ₂ O ₃ 0.03 NiO 0.02 BaO none SrO trace Cu trace	100.24	2.911
112 A1. I	45.14	17.41	0.20	9.27	5.75	9.06	2.75	1.81	2.53	0.41	2.10	0.46	0.07	CO ₂ 3.20 ZrO ₂ none SO ₃ none Cl none FeS ₂ 0.09 Cr ₂ O ₃ 0.01 V ₂ O ₃ 0.07 NiO none BaO none SrO trace Li ₂ O none	100.33	2.941

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
103	Dundas, near Sydney, New South Wales.	W. N. Benson.	W. N. Benson, Pr. R. Soc. N. S. W., XLV, p. 186, 1911.	Hornblende basalt.	Incorrect in op. cit., XLIV, p. 544, 1910.
104	Dundas, Pennant Hills, New South Wales.	H. P. White.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 230, 1903.	Olivine basalt.	
105	Prospect Quarry, near Sydney, New South Wales.	J. C. H. Mingaye.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 230, 1903.	Dolerite.	
106	Hurstville, near Sydney, New South Wales.	J. C. H. Mingaye.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 230, 1903.	Olivine basalt.	
107	Seal Bay, near Sydney, New South Wales.	H. P. White.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 230, 1903.	Olivine basalt.	
108	Guildford, near Sydney, New South Wales.	H. P. White.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 230, 1903.	Dolerite.	Altered.
109	Bong Bong Mountain, Kiama, New South Wales.	H. P. White.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII, p. 58, 1905.	Dolerite.	
110	Minamurra River, Kiama, New South Wales.	Survey laboratory.	Dep. Min. N. S. W. A. R. (1913), p. 191, 1914.	Dolerite.	
111	Near Wollongong, New South Wales.	W. A. Greig.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Olivine basalt.	
112	Near Wollongong, New South Wales.	J. C. H. Mingaye.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Analcite basalt.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
113 A1. I	46.12	12.39	2.70	9.53	10.26	10.00	2.72	1.56	1.80	0.26	1.28	0.46	0.19	CO ₂ 0.77 ZrO ₂ none SO ₃ 0.15 Cl 0.08 S none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.06 NiO none BaO 0.01 SrO trace Li ₂ O none Cu trace	100.36	3.013
114 A1. I	44.52	15.36	2.40	7.83	9.49	7.14	3.98	1.71	4.83	0.75	1.25	0.56	0.11	CO ₂ 0.43 ZrO ₂ none SO ₃ none Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ trace NiO 0.02 BaO 0.02 SrO none Li ₂ O none	100.40	2.755
115 A1. I	42.54	12.57	7.20	7.64	6.41	8.90	3.24	2.29	2.72	1.70	2.12	1.18	0.18	CO ₂ 1.06 ZrO ₂ 0.08 SO ₃ none S trace Cr ₂ O ₃ trace V ₂ O ₅ 0.02 NiO none BaO 0.06 SrO trace	99.91	2.845
116 A1. I	43.38	19.24	none	7.64	8.88	9.16	3.72	1.32	3.78	0.42	1.28	0.86	0.06	CO ₂ 0.48 ZrO ₂ none SO ₃ none Cl 0.03 S none Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.03 NiO none BaO 0.01 SrO none Li ₂ O none Cu trace	100.31	2.872
117 A1. I	42.50	9.28	2.60	6.66	18.84	9.60	1.95	0.92	4.40	0.48	0.70	0.49	0.12	CO ₂ 1.49 ZrO ₂ none SO ₃ trace Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ 0.02 NiO 0.04 BaO 0.02 SrO none Cu none	100.11	2.938
118 A1. I	41.40	15.39	4.00	6.84	3.41	12.02	2.81	2.13	4.26	0.52	0.95	0.32	0.16	CO ₂ 5.98 ZrO ₂ none SO ₃ none Cl trace S none Cr ₂ O ₃ none NiO none BaO 0.06 SrO trace Li ₂ O none	100.25	2.792
119 A1. I	41.22	15.60	1.99	8.95	6.26	9.96	2.21	2.02	1.87	0.68	1.44	0.37	0.06	CO ₂ 7.12 SO ₃ 0.03 Cl 0.01 Cr ₂ O ₃ trace V ₂ O ₅ trace NiO trace BaO 0.19 SrO trace Li ₂ O trace	100.48	2.919
120 A2. II	50.50	16.01	1.40	8.98	6.13	8.05	3.08	2.02	0.29	0.48	2.04	0.39	trace	CO ₂ 0.68	99.97	2.86
121 A2. II	45.86	13.19	2.82	8.61	10.58	9.09	2.44	1.00	1.33	1.66	2.20	none	0.24	CO ₂ 0.60 SO ₃ trace NiO 0.03	100.16	2.922
122 A1. I	44.91	13.77	5.28	5.81	12.19	8.56	1.73	0.94	3.40	1.34	1.73	0.32	0.33	CO ₂ trace Cl none Cr ₂ O ₃ 0.05 NiO 0.03	100.39	2.874
123 A3. III	43.88	16.58	5.53	9.11	5.77	9.60	2.02	1.06	2.22	0.64	3.52	trace			99.93	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
113	Kangaroo Mountain, New South Wales.	W. A. Greig.	G. W. Card, pers. com.	Olivine basalt.	
114	Kembla, New South Wales.	H. P. White.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Olivine dolerite.	
115	Byarong Creek, Kembla, New South Wales.	W. A. Greig.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Analcite basalt.	
116	South Bulli, New South Wales.	W. A. Greig.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Olivine basalt.	
117	South Bulli, New South Wales.	H. P. White.	G. W. Card, pers. com.	Basalt.	
118	Murramarrang, New South Wales.	H. P. White.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Dolerite.	
119	Long Reef, Narrabeen, New South Wales.	H. P. White.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 230, 1903.	Dolerite.	
120	Will Will Rock, Bourke County, Victoria.	F. L. Stillwell.	F. L. Stillwell, Pr. R. Soc. Vict., XXIV, p. 177, 1911.	Basalt.	
121	Colungulac, Camperdown District, Victoria.	A. G. Hall.	H. J. Grayson, Mem. G. S. Vict., No. 9, p. 22, 1910.	Basalt.	
122	Berrys Creek, Victoria.	D. J. Mahony.	A. R. Sec. Min. Vict. (1911), p. 62, 1912.	Basalt.	
123	Moroka Valley, near Mount Wellington, Gippsland, Victoria.	Ampt.	E. O. Thiele, Pr. R. Soc. Vict., XXI, p. 267, 1908.	Basalt.	Altered.

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
124 A2. II	53.85	14.00	0.36	8.12	4.51	6.43	3.14	0.60	2.94	0.06	0.55		0.87	CO ₂ S 4.37 none	99.80	
125 A2. II	52.10	16.35	1.18	7.91	3.71	7.35	3.30	0.68	2.36	0.12	2.08	0.45	0.35	CO ₂ FeS ₂ 2.49 0.17	100.60	
126 A2. II	48.05	13.82	0.73	15.43	3.91	5.78	1.14	0.30	4.24	0.03	1.14	0.27	0.97	CO ₂ FeS ₂ 4.42 0.32	100.60	
127 A4. IV	43.56	18.88	8.24	n. d.	2.22	12.47	2.64	3.52	2.28		0.45			CO ₂ 5.74	100.00	
128 A2. II	42.05	14.35	3.64	8.96	13.98	7.45	3.16	1.31	0.99	0.32	1.92	0.83	0.30	CO ₂ SO ₃ 0.76 0.10	100.12	
129 A2. II	32.36	26.15	5.04	10.30	3.76	10.74	1.23	1.68	5.66		1.55		0.25	CO ₂ Cr ₂ O ₃ 1.12 0.05	99.89	
130 A3. III	36.85	11.97	13.90	6.54	10.73	9.00	4.13	0.79	(4.74)	(5.48)	4.05	1.25	1.13	SO ₂ S trace 0.14 CoO 0.04 CuO 0.10	100.62	
131 A3. III	35.86	12.10	7.82	8.09	9.72	12.08	6.23	1.93	n. d.		2.90	1.08	0.39	SO ₃ FeS ₂ 0.27 1.40 CuO 0.25	100.12	
132 A3. III	47.33	17.96	12.64	0.51	3.97	6.29	3.67	1.10	(3.08)	(2.38)	4.84	1.05	0.64	SO ₃ S 0.07 CuO 0.07 0.15	100.29	
133 A3. III	45.79	15.09	5.34	5.58	5.92	10.21	3.67	0.90	n. d.		3.25	0.29	0.49	SO ₃ CuO 2.54 0.18	99.25	
134 A3. III	51.65	19.12	6.60	n. d.	0.76	5.50	7.47	1.92	2.30		3.50	0.98	0.76		100.56	
135 A3. III	42.98	20.31	16.63	0.24	5.57	7.22	2.40	0.21	4.26						99.82	
136 A3. III	41.82	17.63	15.02	0.90	4.48	5.43	3.06	0.25	11.14						99.73	
137 A3. III	38.40	19.02	17.31	0.41	4.87	6.89	2.72	0.30	10.22						100.14	
138 A3. III	40.50	14.85	14.30	n. d.	4.32	6.10	4.13	0.96	10.10		4.20	0.82	0.28		100.56	

NEPHELITE SYENITE.

1 A2. II	50.72	15.45	11.82	0.80	0.13	0.14	10.83	2.94	4.66		2.84	none	0.31		100.64	2.70
2 A1. I	55.90	19.75	1.00	2.05	0.59	3.10	7.25	5.61	2.00		0.70	0.10	0.10	CO ₂ 1.85 SO ₃ 0.04 Cl trace BaO 0.09 SrO trace	100.77	
3 A1. I	49.96	16.53	3.18	4.35	3.95	8.24	4.81	2.95	0.70	0.07	2.73	0.32	0.10	CO ₂ 0.80 Cl 0.22 FeS ₂ 1.37 BaO 0.05 SrO 0.02	100.35	

BASALT—Continued.

No	Locality.	Analyst.	Reference.	Rock name.	Remarks.
124	Bamboo Creek, Pilbara, Western Australia.	C. C. Williams.	A. G. Maitland, W. Aust. G. S. B. 15, p. 12, 1904.	Greenstone (dolerite).	
125	Sherlock River, Pilbara, Western Australia.	Not stated.	L. Glanert, W. Aust. G. S. B. 41, p. 32, 1911.	Dolerite.	
126	Pecawah Hill, Pilbara, Western Australia.	Not stated.	L. Glanert, W. Aust. G. S. B. 41, p. 28, 1911.	Dolerite.	
127	Stephenson Island, Whangaroa, New Zealand.	J. S. MacLaurin.	Bell and Clarke, G. S. N. Z. B. 8, p. 65, 1909.	Basalt.	
128	Punakaiki River, Waiwhero, Reefton District, New Zealand.	Henderson.	P. G. Morgan, pers. com.		
129	Humbag Creek, Mikonui, New Zealand.	J. S. MacLaurin.	P. G. Morgan, G. S. N. Z. B. 6, p. 141, 1908.	Basalt.	Altered.
130	Panahou, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Ignited before analysis. In W. T., p. 455.
131	Panahou, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Ignited before analysis. In W. T., p. 455.
132	Mount Kobala, Waimoa, Hawaii, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Ignited before analysis. In W. T., p. 453.
133	Kilauea, Hawaii, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 424, 1896.	Basalt.	Pelé's hair. Decomposed by SO ₂ . Ignited before analysis. In W. T., p. 325.
134	Perseverance Harbor, Campbell Island.	B. C. Aston.	B. C. Aston, Subant. Islds., II, p. 767, 1909.	Basalt.	Weathered.
135	Gazelle Harbor, Kerguelen Island	R. Reinisch.	R. Reinisch, D. Tiefs. Exp., X (3); p. 64, 1908.	Basalt tuff.	
136	Kerguelen Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (2), p. 219, 1908.	Basalt tuff.	
137	Green Lake, Kerguelen Island.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (2), p. 219, 1908.	Basalt tuff.	
138	Antipodes Island.	B. C. Aston.	B. C. Aston, Subant. Islds., II, p. 763, 1909.	"Black scoria" (basalt).	

NEPHELITE SYENITE.

1	S. Siorarsuit, Ilímausak region, Greenland.	C. Detlefsen.	N. V. Ussing, G. Juhl., p. 168, 1911.	Aegirite lujavrite.	
2	Mount Royal, Montreal, Quebec.	M. F. Connor.	F. D. Adams, Cong. G. Int., XII, Guide 3, p. 41, 1913.	Nephelite syenite.	
3	Mount Royal, Montreal, Quebec.	M. F. Connor.	F. D. Adams, Cong. G. Int., XII, Guide 3, p. 46, 1913.	Nephelite syenite.	

NEPHELITE SYENITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
4 A1. I	45.68	18.26	2.87	3.98	2.63	8.06	6.41	3.81	0.75	0.07	2.58	0.22	0.14	CO ₂ 2.90 Cl 0.10 FeS ₂ 0.38 Fe ₂ Si ₂ 0.80 BaO 0.01 SrO 0.02	99.67	
5 A2. II	43.67	20.91	3.54	8.01	1.46	7.37	6.73	2.25	2.52		0.78	0.11	0.05	CO ₂ 2.37	99.77	
6 A3. III	53.38	20.22	1.56	1.99	0.29	3.29	7.89	6.21	3.43				trace	FeS ₂ 1.77	100.03	
7 A2. II	56.44	15.54	3.27	3.67	1.73	4.16	5.81	4.27	2.06	0.44	1.16	0.83		CO ₂ 0.97	100.35	
8 A2. II	58.43	19.82	2.74	1.16	0.02	1.08	9.70	4.09	2.34		trace	0.02	0.08	CO ₂ trace Cl 0.44	99.92	
9 A2. II	56.67	19.64	3.45	0.86	0.02	1.25	10.08	4.07	3.66		trace	0.03	0.06	CO ₂ trace Cl trace	99.79	
10 B2. III	53.58	25.26	0.64	1.20	0.08	1.20	10.49	5.28	0.04		0.27	trace		CO ₂ 0.79 Cl 0.50	99.33	
11 A2. II	52.35	14.11	7.98	2.17	0.66	4.65	9.30	2.78	3.20		0.59		0.62	CO ₂ 1.50 ZrO ₂ 0.39	100.30	
12 A2. II	56.26	23.59	0.85	2.61	0.27	0.54	7.77	5.72	0.37		0.47		0.09	CO ₂ 1.37	99.91	
13 A2. II	44.63	13.77	7.30	5.60	4.47	7.96	4.20	2.65	4.04		4.25	0.09	0.08	CO ₂ 1.34 CuO 0.05	100.43	
14 A1. I	51.48	17.07	1.90	4.95	1.10	3.04	5.65	5.22	3.25	0.67	1.16	0.41	0.26	CO ₂ 4.07 ZrO ₂ none SO ₃ none Cl 0.11 S none Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO 0.06 Cu none	100.40	2.569

PHONOLITE.

1 A2. II	54.95	18.64	4.75	1.55	0.60	2.27	4.91	7.65	3.35	0.90	0.42	0.18	0.34		100.51	
2 A3. III	52.73	20.05	3.43	0.99	0.17	3.35	7.94	4.77	4.85	0.69		trace		CO ₂ 0.93 BaO 0.11	100.01	2.466
3 A2. II	48.07	18.36	3.95	3.39	0.32	3.76	8.72	4.71	4.65	0.45		0.14	0.55	CO ₂ 2.65	99.72	2.60
4 A2. II	60.05	19.97	4.32	1.04	0.23	0.91	7.69	3.24	1.26	0.15	0.11		0.79	Cl 0.28	100.04	2.708
5 A2. II	56.74	20.30	1.06	n. d.	0.23	0.57	0.62	13.36	1.15	0.33	0.58	0.25	none	ZrO ₂ 0.07 FeS ₂ 4.65 BaO 0.19 SrO trace	100.10	
6 A2. II	52.20	20.67	3.26	1.38	0.48	4.43	6.61	4.90	3.56	0.36	0.14	0.12	0.09	CO ₂ 1.54 SO ₃ 0.04 BaO 0.09	99.87	2.463

NEPHELITE SYENITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
4	Westmont, Mount Royal, Montreal, Quebec.	M. F. Connor.	F. D. Adams, Cong. G. Int., XII, Guide 3, p. 46, 1913.	Nephelite syenite.	Groundmass of breccia.
5	Monmouth Township, Ontario.	N. N. Evans.	Adams and Barlow, Tr. R. Soc. Can., II (4), p. 37, 1909.	Nephelite syenite.	Also in Can. G. S. Mem. 6, p. 270, 1910.
6	Diamond Jo quarry, Magnet Cove, Arkansas.	Brackett and Smith.	J. F. Williams, Ig. R. Ark., p. 238, 1891.	Foyaite.	In W. T., p. 295.
7	Mauchline, Ayrshire, Scotland.	M. Dittrich.	G. W. Tyrrell, G. Mag. (V), IX, p. 72, 1912.	Analcite syenite.	
8	Nagy Kövez, Mecsek Mountains, Hungary.	B. Mauritz.	B. Mauritz, T. M. P. M., XXXI, p. 475, 1912.	Foyaite.	Much zeolitized.
9	Somlo, Mecsek Mountains, Hungary.	B. Mauritz.	B. Mauritz, T. M. P. M., XXXI, p. 472, 1912.	Foyaite.	Much zeolitized.
10	Ditro, Siebenbürgen, Hungary.	J. v. Szadeczky.	J. v. Szadeczky, Ref. N. J., 1901, I, p. 402.	Nephelite syenite.	In W. T., p. 213.
11	Wijdhoek, Pilandsberg, Transvaal.	F. Pisani.	H. A. Brouwer, C. R., CXLIX, p. 1008, 1909.	Lujavrite.	Also in Transv. Nephsy., p. 132, 1910.
12	Mount Sobatchia, Ural Mountains.	Bourdakow.	A. Karpinsky, Cong. G. Int., VII, Guide V, p. 22, 1897.	Miascite.	In W. T., p. 211.
13	Banatette River, Kupang Bay, Timor Island.	O. Pufahl.	A. Wichmann, Samml. G. R. Mus. Loiden, II, p. 87, 1887.	Foyaite.	In W. T., p. 343.
14	Minumurra River, Kiama, New South Wales.	H. P. White.	Jaquet, Card and Harper, Rec. G. S. N. S. W., VIII, p. 36, 1905.	Nephelite syenite.	

PHONOLITE.

1	Blairmore, Alberta, Canada.	C. W. Dickson.	C. W. Knight, Can. Rec. Sci., IX, p. 276, 1905.	Blairmorite, (analcite trachyte tuff).	
2	Heron Bay, Lake Superior, Ontario.	H. W. Charlton.	A. P. Coleman, J. G., VII, p. 435, 1899.	Heronite.	In W. T., p. 207.
3	Heron Bay, Lake Superior, Ontario.	A. H. A. Robinson.	A. P. Coleman, Rep. Bur. Min. Ont., IX, p. 189, 1900.	Heronite.	Cf. No. 13, II.6.1.4.
4	Gales Point, Essex County, Massachusetts.	A. S. Eakle.	A. S. Eakle, A. J. S., VI, p. 491, 1898.	Biotite tinguaite.	In W. T., p. 197.
5	Victor, Cripple Creek, Colorado.	W. F. Hillebrand.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 189, 1906.	Phonolite.	Altered. In W. T., p. 403.
6	Sabucan, Ibitimi, Paraguay.	L. Lindner.	L. Milch, T. M. P. M., XXIV, p. 217, 1905.	Phonolite.	

PHONOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
7 A3. III	48.55	11.97	5.73	4.41	4.77	10.06	4.86	4.30	2.62		3.04	trace			100.31	
8 A2. II	50.26	20.15	3.67	2.62	1.43	3.28	8.09	4.67	3.85		0.24	0.05	trace	CO ₂ 0.96 X 0.75 SO ₃ 0.16	100.18	
9 A2. II	45.48	18.75	3.99	1.57	1.50	7.22	10.69	3.80	2.10		1.18	0.46	0.15	CO ₂ 2.77 BaO 0.13	99.79	
10 A2. II	55.91	19.73	2.73	1.36	0.75	2.39	7.24	2.13	4.33		trace	0.18	0.46	CO ₂ 4.53 SO ₃ 0.21 Cl 0.10 F trace	99.41	2.471
11 A1. I	51.02	18.63	3.14	0.84	1.02	7.89	4.13	6.08	1.10		trace	0.16	0.59	CO ₂ 4.53 SO ₃ 0.29 Cl 0.09 F trace Ce ₂ O ₃ trace Cu 0.15	99.66	2.480
12 A2. II	54.98	13.28	10.60	0.39	1.80	1.55	5.46	6.32	1.78		2.82	0.65	0.37	Cl 0.06	100.06	2.75
13 A3. III	54.71	11.39	13.67	0.48	1.70	1.82	6.54	5.42	0.90	0.73	2.78		trace	Cl trace	100.14	2.70
14 A2. II	53.40	18.21	2.19	2.68	0.96	3.66	8.45	3.87	3.37		1.25	0.06	0.70	CO ₂ 1.06 SO ₃ 0.15 Cl 0.02	100.03	2.490
15 A3. III	53.00	16.47	5.29	3.10	0.63	4.15	7.21	5.09	1.68	trace	0.72	trace	0.37	CO ₂ 3.20 SO ₃ none Cl none	100.91	2.527
16 A2. II	56.49	18.77	3.00	1.46	0.63	3.29	7.10	5.18	1.83	0.62	0.74	0.27	0.32	CO ₂ 1.00	100.70	2.517
17 A3. III	47.00	17.86	4.85	4.02	1.10	5.30	6.84	4.55	1.53	1.10	trace	0.32	1.25	CO ₂ 4.80	100.52	2.492
18 A2. II	58.33	19.31	3.77	0.69	0.27	1.15	8.93	5.08	2.39		0.13	0.02		CO ₂ 0.04 SO ₃ 0.12	100.23	2.580
19 A3. III	52.40	19.93	3.83	1.51	0.32	1.34	11.71	4.10	3.54	0.23		trace	0.45	CO ₂ 0.21 SO ₃ none Cl 0.05	99.62	2.499
20 A3. III	51.98	20.61	4.08	1.32	0.38	1.12	11.69	4.42	3.29	0.32		trace	0.40	CO ₂ 0.44 SO ₃ none Cl 0.09	100.14	2.492
21 A3. III	50.15	18.45	4.71	1.24	0.37	1.39	12.02	4.65	5.25	0.78		trace	0.26	CO ₂ 0.52 SO ₃ none Cl trace	99.79	2.434
22 A2. III	51.98	22.46	2.48	1.87	0.83	4.63	3.66	3.93	2.06	1.08	4.71		0.08	CO ₂ 0.04 NiO 0.04 BaO none SrO none	99.85	

ESSEXITE.

1 A2. II	44.62	7.90	4.22	5.67	14.00	19.44	1.20	0.31	0.75	0.07	1.87		0.10	CO ₂ 0.60	100.75	
2 A2. II	44.39	8.36	2.18	8.25	16.70	12.90	1.28	1.28	2.08	0.02	1.98		0.15		99.57	

PHONOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
7	Centurion, Paraguay.	M. Goldschlag.	M. Goldschlag, In. Diss. Jena, p. 24, 1913.	Phonolite.	
8	Alnö, Sweden.	P. Jannasch.	H. Rosenbasch, Elem. Gest., p. 215, 1898.	Tinguaite.	In W. T., p. 297.
9	Pyhäkuru, Kuolajärvi, Finland.	I. G. Sundell.	I. G. Sundell, B. C. G. Fin., No. 16, p. 14, 1905.	Nephelite porphyry.	
10	Schwintel, Hegau, Baden.	G. F. Föhr.	G. F. Föhr, In. Diss. Wurzb., p. 30, 1883.	Phonolite.	In W. T., p. 203.
11	Gennersbohl, Hegau, Baden.	G. F. Föhr.	G. F. Föhr, In. Diss. Wurzb., p. 24, 1883.	Phonolite.	In W. T., p. 297.
12	Michelsberg, Katzenbuckel, Odenwald.	O. N. Heidenreich.	W. Freudenberg, Mt. Bad. G. L.-A., V, (1), p. 315, 1907.	Tinguaite.	
13	Michelsberg, Katzenbuckel, Odenwald.	W. Sonne.	W. Freudenberg, Mt. Bad. G. L.-A. V (1), p. 315, 1907.	Tinguaite.	
14	Pömmelerle, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XXI, p. 576, 1902.	Nephelite porphyry (phonolite).	
15	Near Topkowitz, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIX, p. 33, 1900.	Tinguaite porphyry.	In W. T., p. 297.
16	Ziegenberg, near Nestersitz, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 97, 1894.	Phonolite.	In W. T., p. 213.
17	Königsbachthal, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIX, p. 76, 1900.	Sodalite porphyry.	MnO high? In W. T., p. 465.
18	Nagy Köves, near Fünfkirchen, Mecsek Mountains, Hungary.	K. Gremse.	K. A. Lossen, Z. D. G. G., XXXIX, p. 507, 1887.	Phonolite.	Zeolitized. In W. T., p. 213.
19	Kosciusko, New South Wales.	F. B. Guthrie.	David, Guthrie, and Woolnough, Pr. R. Soc. N. S. W., XXXV, p. 366, 1901.	Munionsgite (tinguaite).	North border of dike.
20	Kosciusko, New South Wales.	F. B. Guthrie.	David, Guthrie, and Woolnough, Pr. R. Soc. N. S. W., XXXV, p. 366, 1901.	Munionsgite (tinguaite).	South border of dike.
21	Kosciusko, New South Wales.	F. B. Guthrie.	David, Guthrie, and Woolnough, Pr. R. Soc. N. S. W., XXXV, p. 366, 1901.	Munionsgite (tinguaite).	Center of dike.
22	Mount Ningadhurn, Nandewar Mountains New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W. XXXII, p. 903, 1908.	Phonolite- trachyte.	Altered.

ESSEXITE.

1	Rougemont Mountain, Rouville County, Quebec.	M. F. Connor.	J. J. O'Neill, Can. G. S. Mem. 43, p. 71, 1914.	Essexite.	.
2	Rougemont Mountain, Rouville County, Quebec.	M. F. Connor.	J. J. O'Neill, Can. G. S. Mem. 43, p. 81, 1914.	Essexite porphyry.	

ESSEXITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3 A1. I	43.10	13.94	4.92	6.93	8.86	14.65	2.50	0.89	0.55	0.15	2.80	0.27	0.14	CO ₂ 0.64 SO ₃ none Cl trace S 0.22 BaO 0.03 SrO 0.03	100.62	
4 A1. I	46.77	14.91	7.80	4.90	2.94	6.30	4.97	2.37	4.23	0.92	2.31	0.98	0.29	CO ₂ trace ZrO ₃ none FeS ₂ 0.07 Cr ₂ O ₃ none V ₂ O ₅ 0.02 BaO 0.04 SrO 0.03 Li ₂ O trace	99.90	
5 A2. II	40.40	13.49	5.87	4.88	8.01	10.02	3.45	2.94	3.06	0.61	2.21	1.09	0.63	CO ₂ 3.72 S 0.19	100.57	
6 A3. III	51.03	8.48	11.95	3.21	6.34	6.96	5.42	4.83	1.68					SO ₃ 0.67 Cl 0.37	100.94	2.86
7 A1. I	48.90	14.70	4.14	3.68	3.95	8.26	5.22	0.56	2.44	0.52	0.95	0.79	0.03	CO ₂ 5.42 SO ₃ 0.04 BaO 0.31 SrO 0.13 Li ₂ O trace	100.04	
8 A2. II	46.95	17.05	3.61	9.53	7.11	7.04	3.42	0.82	2.05		1.58	0.63	0.03	CO ₂ 0.80	100.62	
9 A1. I	48.63	15.03	0.51	9.55	6.34	5.95	5.32	0.56	3.16	0.93	2.04	0.34	0.20	CO ₂ 1.12 FeS ₂ 0.44 NiO none BaO 0.04 Li ₂ O trace	100.16	
10 A1. I	46.06	15.94	2.94	7.44	4.14	7.04	4.95	2.76	4.22	0.55	2.56	0.84	0.31	CO ₂ 0.11 Cl trace FeS ₂ 0.36 NiO none BaO 0.10 SrO none	100.32	
11 A1. I	45.71	15.23	2.84	6.93	8.11	7.34	3.96	1.31	4.70	1.54	1.64	0.47	0.54	S 0.08 Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.03 NiO 0.02 BaO 0.04 Li ₂ O trace	100.51	
12 A1. I	43.55	14.84	3.09	7.44	7.41	7.66	3.82	1.90	5.08	1.79	2.48	0.63	0.23	CO ₂ 0.53 Cl trace FeS ₂ 0.13 NiO none BaO 0.07 SrO none	100.65	
13 A2. II	44.50	15.28	2.81	6.88	4.91	12.08	3.94	2.41	3.09	0.72	2.43	0.24	0.26	CO ₂ 1.16	100.71	
14 A1. I	40.87	16.23	1.31	7.37	9.83	11.13	2.78	0.53	4.28	1.35	2.85	0.52	0.64	CO ₂ 0.38 FeS ₂ 0.21 NiO 0.06 BaO none	100.34	
15 A2. II	41.80	14.56	6.09	6.41	4.66	14.87	4.25	1.94	1.18		4.14	0.52		CO ₂ 0.40	100.82	
16 A2. II	48.79	17.23	1.99	6.78	2.92	5.58	5.48	3.77	3.93	0.28	1.44	1.11		CO ₂ 0.16 SO ₃ 0.29	99.75	2.66
17 A3. III	46.45	15.49	4.86	6.83	3.47	9.38	3.23	0.57	3.80			0.85		CO ₂ 4.90	99.83	
18 A3. III	43.40	13.60	6.66	6.83	8.15	9.05	1.66	0.64	3.20			0.26		CO ₂ 7.10	100.55	
19 A6. III	42.15	18.75	4.94	7.30	3.74	9.75	3.34	2.07	4.35			0.58		CO ₂ 3.10	100.07	

ESSEXITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	Mount Royal, Montreal, Canada.	M. F. Connor.	F. D. Adams, Cong. G. Int., XII, Guide 3, p. 39, 1913.	Essexite.	
4	Mapleton Township, Aroostook County, Maine.	W. F. Hillebrand.	H. E. Gregory, U. S. G. S. B. 165, p. 183, 1900.	Teschenite.	In W. T., p. 261.
5	Mount Solon, Augusta County, Virginia.	J. W. Watson.	Watson and Cline, B. G. S. A., XXIV, p. 320, 1913.	Teschenite.	
6	Three Peaks, Crazy Mountains, Montana.	A. M. Comey.	J. E. Wolff, North Transcont. Surv., p. (11), 1885.	Nephelite rock (theralite).	In W. T., p. 299.
7	Shields River, Crazy Mountains, Montana.	H. N. Stokes.	W. H. Weed, U. S. G. S. B. 148, p. 146, 1897.	Theralite.	Altered. In W. T., p. 457.
8	Cerro Donoso, Patagonia.	N. Sahlbom.	P. D. Quensel, B. G. Inst. Ups., XI, p. 93, 1911.	Essexite porphyry.	
9	Lochend, near Edinburgh, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem., Sh. 32, p. 293, 1910.	Essexite.	
10	Mons Hill, Dalmeny, Mid-Lothian, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem., Sh. 32, p. 293, 1910.	Teschenite.	
11	Blackburn, Linlithgowshire, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot. Mem., Sh. 32, p. 299, 1910.	Teschenite.	
12	Mochrie's crag, Linlithgowshire, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem., Sh. 32, p. 299, 1910.	Teschenite.	
13	Lugar, Ayrshire, Scotland.	A. Scott.	G. W. Tyrrell, pers. com.	Teschenite-basalt.	
14	Barshaw House, near Paisley, Glasgow, Scotland.	E. G. Radley.	G. S. G. B., Sum. Prog., (1907), p. 55, 1908.	Theralite.	
15	Monchique, Serra de Monchique, Portugal.	Singhof.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 237, 1896.	Segregation in nephelite syenite (teschenite).	In W. T., p. 349.
16	Oberberg, near Wissenbach, Hesse-Nassau.	F. Stadler.	R. Brauns, N. J. B. B., XXVII, p. 274, 1909.	Essexite.	
17	Hotzendorf, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXX, p. 72, 1896.	Teschenite.	In W. T., p. 457.
18	Lohtka, Frankstadt, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXX, p. 73, 1896.	Teschenite.	In W. T., p. 457.
19	Bluendorf, Neutitschein, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXX, p. 71, 1896.	Teschenite.	In W. T., p. 487.

ESSEXITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
20 A3. III	38.85	15.65	10.43	8.88	1.49	11.35	1.96	0.62	4.50			0.62		CO ₂ 6.25	100.60	
21 A3. III	39.20	15.52	8.80	5.08	6.49	14.45	2.04	1.11	3.70			1.18		CO ₂ 2.80	100.37	
22 A2. II	46.47	18.77	3.55	4.83	3.90	7.28	3.73	4.65	4.93		1.21	0.14		CO ₂ 0.34	99.80	
23 A2. II	42.91	16.68	2.00	6.56	6.25	10.31	3.39	2.09	3.17		1.70	0.21	0.11	CO ₂ 4.52 Cl trace	99.90	
24 A2. II	49.73	17.68	3.09	5.59	2.33	5.70	6.01	2.75	4.55	1.09	0.86	0.40	0.21		99.99	
25 A2. II	49.87	14.98	6.17	4.40	1.77	6.34	5.08	2.04	1.66	2.60	0.74			CO ₂ 3.22 SO ₂ 0.25 Cl trace S 0.76	99.88	2.722
26 A2. II	46.20	16.01	5.08	7.01	5.07	7.09	6.50	2.04	4.31		0.76	0.51	0.16	CO ₂ 0.21	100.95	
27 A1. I	48.25	17.38	4.54	5.31	2.13	6.03	5.81	3.00	3.85		2.73	0.65	0.30	CO ₂ 0.51 Cl 0.09 F none S 0.04 BaO 0.03 SrO trace	100.65	2.751
28 A2. II	58.82	16.91	2.40	4.59	0.88	2.42	6.74	2.96	0.56	1.98	1.14	0.34	0.13	CO ₂ 0.54 Cl 0.01	100.42	2.665
29 A1. I	43.06	16.31	5.40	7.61	5.49	9.37	3.12	1.07	2.93	1.16	2.46	0.32	0.23	CO ₂ 1.36 Cl 0.02 S 0.26 V ₂ O ₅ 0.05 NiO 0.06 BaO 0.02 SrO trace	100.30	2.814
30 A1. I	41.05	12.27	6.39	11.07	6.38	10.96	2.43	0.53	3.58	0.44	4.39	0.19	0.17	CO ₂ 0.03 ZrO ₂ none Cl trace S 0.35 Cr ₂ O ₃ trace V ₂ O ₅ 0.06 NiO 0.02 BaO none SrO trace Cu trace	100.31	3.058
31 A1. I	46.22	9.33	5.85	7.39	3.08	10.80	3.21	1.80	1.78	0.94	3.70	0.80	0.32	CO ₂ 4.46 SO ₂ 0.52 Cl 0.03 S 0.10 Cr ₂ O ₃ 0.02 V ₂ O ₅ 0.02 BaO 0.24 SrO none Li ₂ O trace	100.41	2.801

TRACHYDOLERITE.

1 A2. II	45.27	15.03	4.04	9.10	6.59	6.64	5.07	1.08	1.85	0.14	4.41	0.16	trace	CO ₂ 0.38 SO ₂ none Cl trace	99.76	2.988
2 A1. I	46.71	15.59	8.27	1.40	4.90	6.41	4.97	2.85	3.16	1.08	2.40	0.76	0.18	CO ₂ 1.06 NiO trace BaO 0.08 SrO 0.06	99.88	
3 A2. II	44.49	13.03	2.78	8.24	11.23	8.58	3.16	2.25	0.76	0.55	2.60	0.92	0.17	CO ₂ 0.86 Cr ₂ O ₃ 0.02 NiO 0.07	99.71	
4 A2. II	55.39	16.81	9.87	2.60	3.22	6.03	0.83	0.62	1.07		2.19	0.69		CO ₂ 0.93	100.25	2.78

ESSEXITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
20	Neutitschein, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXX, p. 72, 1896.	Teschenite.	In W. T., p. 457.
21	Jasenitz, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXX, p. 74, 1896.	Teschenite.	In W. T., p. 457.
22	Val dei Coccoletti, Monte Mulatto, Predazzo, Tyrol.	M. Dittrich.	J. Romberg, Sb. Pr. Ak. W., I, p. 743, 1902.	Theralite.	
23	Val Deserta, Monte Mulatto, Predazzo, Tyrol.	M. Dittrich.	J. Romberg, Sb. Pr. Ak. W., p. 104, 1904.	Essexite.	
24	Kursebi, Caucasus.	D. Beljankin.	D. Beljankin, Ann. Inst. Poly. Pet. Grt., XVII, p. 10, 1912.	Teschenite.	
25	Ribeira das Voltas, Madeira.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 399, 1912.	Essexite.	
26	Hamasat, Massaua, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 87, 1909.	Teschenite.	
27	Minussinsk, Jenissei, Siberia.	E. Collett.	J. Rakovsky, B. Ac. Imp. St. P., p. 251, 1911.	Teschenite.	
28	Prospect, near Sydney, New South Wales.	H. P. White.	Jensen and Jevons, Pr. R. Soc. N. S. W., XLV., p. 539, 1912.	Essexite aplite.	
29	Prospect, near Sydney, New South Wales.	J. C. H. Mingaye.	Jensen and Jevons, Pr. R. Soc. N. S. W., XLV, p. 504, 1912.	Essexite.	
30	Prospect, near Sydney, New South Wales.	J. C. H. Mingaye.	Jensen and Jevons, Pr. R. Soc. N. S. W., XLV, p. 504, 1912.	Pallio-essexite.	
31	Jellore Creek, Mittagong, New South Wales.	D. Mawson.	Taylor and Mawson, Pr. R. Soc. N. S. W., XXXVII, p. 341, 1903.	Essexite.	H ₂ O corrected by authors, pers. com.

TRACHYDOLERITE.

1	Nunasarnausak, Himausak Region, Greenland.	C. Winther.	N. V. Ussing, G. Julhb., p. 212, 1911.	Trachydolerite.	
2	Blaikie Heugh, near Traprain Law, East Lothian, Scotland.	W. Pollard.	E. B. Bailey, G. S. Scot. Mem., Sh. 33, p. 126, 1910.	Kulaite.	
3	Halvdans Fjeld, Wood Bay, Spitzbergen.	M. Dittrich.	V. Goldschmidt, Skr. Vid. Krist., 1911, No. 9, p. 16.	Trachydolerite.	
4	Frauenberg, near Breitfirst, Rhöngebirge.	R. Wedel.	R. Wedel, Jb. Pr. G. L.-A., XI, p. 23, 1892.	Trachydolerite.	In W. T., p. 221.

TRACHYDOLERITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
5 A2. II	50.61	19.36	5.28	3.07	2.29	6.39	5.36	2.91	2.45		0.19	1.06	0.61	CO ₂ 0.78 SO ₃ trace Cl 0.08	100.44	
6 A2. II	48.11	16.41	8.96	2.60	3.03	7.96	3.76	2.55	3.10		2.50	0.64		ZrO ₂ 0.27 SO ₃ 0.27	100.18	2.789
7 A3. III	36.59	33.51	15.54	1.78	0.86	0.32	1.10	0.91	9.51						100.12	
8 A3. III	36.58	28.45	12.95	4.54	0.54	0.81	0.94	1.12	13.70						99.63	
9 A3. III	34.33	35.19	9.01	6.90	0.47	0.28	0.61	0.82	13.75						99.36	
10 A3. III	30.82	20.35	16.75	8.08	4.24	5.52	2.01	1.21	11.76						100.74	

MONCHIQUEITE.

1 A1. I	37.34	11.85	5.37	6.40	9.66	11.92	2.91	2.05	2.56	0.24	3.93	0.04	0.18	CO ₂ 5.08 Cl 0.04 FeS ₂ 0.47 BaO 0.04 SrO 0.02	100.09	
2 A2. II	36.69	11.96	5.45	8.90	7.85	10.28	3.88	2.07	0.25	1.70	5.44	0.62	0.38	CO ₂ 3.78 SO ₃ 0.92 Cl 0.04 BaO trace	100.21	
3 A2. II	36.29	10.91	7.55	5.52	9.29	13.48	3.42	1.40	3.65		4.60		0.23	CO ₂ 3.85	100.19	
4 B2. III	42.03	13.60	7.55	6.65	6.41	14.15	1.83	0.97	1.08		3.70	0.57		SO ₃ 0.08 NaCl 0.05 FeS ₂ 0.56	99.23	
5 A2. II	36.40	12.94	8.27	4.59	11.44	14.46	0.97	3.01	2.36		0.42	1.04		CO ₂ 3.94	99.84	
6 A2. II	44.66	12.12	5.81	3.20	8.77	8.14	4.47	2.75	4.33		1.02	2.02	0.21	CO ₂ 2.19	99.69	
7 A2. II	42.46	12.04	3.19	5.34	12.40	12.14	1.21	2.68	4.03		2.47	0.84	0.16	CO ₂ 0.55	99.51	
8 A1. I	44.08	12.80	4.58	3.84	7.22	11.21	2.97	3.31	2.35	0.77	1.43	0.70	0.14	CO ₂ 4.14 ZrO ₂ none SO ₃ 0.01 Cl 0.04 S 0.14 Cr ₂ O ₃ 0.05 BaO 0.13 SrO 0.06 Li ₂ O trace	99.97	
9 A1. I	31.55	9.85	5.27	5.90	7.45	15.22	3.69	3.90	1.82	0.92	4.86	2.34	0.11	CO ₂ 5.27 ZrO ₂ none SO ₃ 1.52 S 0.27 BaO 0.07 SrO 0.09	100.04	
10 A2. II	43.74	14.82	2.40	7.52	6.98	10.81	3.08	2.90	2.94		2.80	0.64		CO ₂ 1.50 Cl trace S 0.10	100.23	2.914
11 A3. III	42.51	12.85	2.67	7.52	12.00	11.83	2.75	2.15	2.96				0.83	CO ₂ 3.46	100.53	2.905

TRACHYDOLERITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
5	Pihlberg, Polzen District, Bohemia.	K. H. Scheumann.	K. H. Scheumann, Abh. Sachs. Ges. W., XXXII, p. 757, 1913.	Sodalite trachy- dolerite.	
6	Mawensi, Kilimanjaro, German East Africa.	C. Klüss.	L. Finckh, Z. D. G. G., LXV, p. 501, 1913.	Basaltoid trachy- dolerite.	ZrO ₂ by color with H ₂ O ₂ .
7	Napoleon's tomb, St. Helena.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 645, 1912.	Trachydolerite.	Altered.
8	James Valley, St. Helena.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 645, 1912.	Trachydolerite.	Altered.
9	Nap Seal, St. Helena	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 645, 1912.	Trachydolerite.	Altered.
10	Westpoint Crater, St. Helena.	R. Reinisch.	R. Reinisch, D. Sudp. Exp., II (7), p. 645, 1912.	Trachydolerite.	Altered.

MONCHIQUEITE.

1	Mile End quarry, Montreal, Quebec.	M. F. Connor.	F. D. Adams, Cong. G. Int., XII, Guide 3, p. 46, 1913.	Monchiquite.	
2	Reservoir, Montreal, Quebec.	B. J. Harrington.	F. D. Adams, Cong. G. Int., XII, Guide 3, p. 46, 1913.	Monchiquite.	
3	Hurry Inlet, Liverpool Land, East Greenland.	N. Sahlbom.	O. Nordensjöld, Medd. Grönl., XXVIII, p. 212, 1908.	Ouachitite.	
4	Fourche Mountain, Little Rock, Arkansas.	Noyes and Brackett.	J. F. Williams, Ig. R. Ark., p. 108, 1891.	Fourchite.	In W. T., p. 333.
5	Near Hot Springs, Arkansas.	L. G. Eakins.	J. F. Kemp in J. F. Williams, Ig. R. Ark., p. 399, 1891.	Ouachitite.	In W. T., p. 349.
6	Musselshell River, Crazy Mountains, Montana.	L. G. Eakins.	W. H. Weed, U. S. G. S. B. 148, p. 144, 1897.	Monchiquite?	In W. T., p. 341.
7	Willow Creek, Castle Mountains, Montana.	L. V. Pirsson.	Weed and Pirsson, U. S. G. S. B. 139, p. 115, 1896.	Monchiquite.	Fe ₂ O ₃ corrected by L. V. P. In W. T., p. 343.
8	Cripple Creek, Colorado.	W. T. Schaller.	Lindgren and Ransome, U. S. G. S. P. P. 54, p. 96, 1906.	Monchiquite.	
9	Near Beaver Creek, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Analcite rock.	
10	Rio do Ouro, Serra de Tingua, Brazil.	P. Jannasch.	Hunter and Rosenbusch, T. M. P. M., XI, p. 464, 1890.	Monchiquite.	In W. T., p. 343.
11	Grainbank, Kirkwall, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edin., XXXIX (IV), p. 391, 1900.	Monchiquite.	In W. T., p. 351.

MONCHIQUE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
12 A1. I	43.55	14.60	5.34	7.46	4.77	7.94	5.01	1.40	4.58	0.63	2.52	0.88	0.55	CO ₂ 0.36 FeS ₂ 0.31 NiO 0.05 BaO 0.27 SrO none	100.42	
13 A1. I	39.54	13.74	4.05	7.85	8.66	9.64	2.24	3.70	2.77	0.61	2.72	1.01	0.40	CO ₂ 2.48 FeS ₂ 0.27 Cr ₂ O ₃ 0.10 V ₂ O ₅ 0.05 NiO 0.05 BaO 0.19 SrO 0.14 Li ₂ O trace	100.06	
14 A2. II	40.26	10.22	2.86	7.14	8.75	13.43	1.51	1.32	3.53	1.24	2.26	0.65	0.20	CO ₂ 5.80 SO ₃ 0.62 Cl trace Cr ₂ O ₃ trace	99.79	
15 A2. II	42.57	15.90	2.10	6.85	3.18	10.55	4.71	3.88	2.00		2.50	trace	0.79	CO ₂ 4.87	99.90	
16 A2. II	43.31	14.13	4.64	6.05	8.43	11.92	2.53	1.74	1.28		2.46	0.53		CO ₂ 3.52 FeS ₂ 0.32	100.66	
17 A2. II	46.69	17.57	2.01	8.57	3.00	8.04	5.25	3.76	1.27		1.45	0.58		CO ₂ 0.88 SO ₃ none Cl 0.04	99.43	2.751
18 A1. I	40.30	12.42	7.64	5.04	12.34	12.10	3.31	1.22	3.32		0.50	0.99	0.02	CO ₂ 0.60 Cl 0.05 F 0.85 S 0.32 BaO 0.20 SrO trace	101.12	2.892
19 A1. I	39.62	12.98	7.58	5.47	9.93	10.55	4.30	1.27	4.33		0.53	1.02	0.15	CO ₂ 0.70 Cl 0.07 F 1.23 S 0.35 BaO 0.26 SrO trace	100.34	2.970
20 A1. I	39.28	13.04	7.83	5.72	9.88	10.88	3.72	1.39	4.25		0.62	1.16	0.05	CO ₂ 0.71 Cl 0.03 S 0.57 BaO 0.68 SrO trace F 0.73	100.54	2.896
21 A1. I	42.52	16.82	2.90	7.56	6.43	9.78	4.02	1.31	5.51	0.47	1.30	1.46	0.15	CO ₂ 0.07 ZrO ₂ none Cl trace S none Cr ₂ O ₃ none V ₂ O ₅ 0.03 NiO none BaO 0.04 SrO trace Li ₂ O none	100.37	2.812
22 A1. I	41.72	16.87	5.90	3.87	4.23	10.32	4.99	2.73	3.67	0.45	1.70	0.85	0.15	CO ₂ 2.54 ZrO ₂ none SO ₃ none Cl 0.03 S none V ₂ O ₅ 0.02 NiO 0.04 BaO 0.13 SrO 0.03	100.24	2.732
23 A1. I	40.62	13.63	7.05	6.07	5.71	10.05	2.23	2.48	4.58	1.30	2.30	1.16	0.08	CO ₂ 0.71 ZrO ₂ none SO ₃ 0.38 S 0.11 Cr ₂ O ₃ none V ₂ O ₅ 0.06 NiO none BaO 1.46 SrO trace Cu trace	99.98	2.844
24 A1. I	40.25	10.83	5.30	8.00	12.53	9.64	3.76	1.48	2.58	0.78	2.74	0.73	0.30	CO ₂ 1.14 ZrO ₂ none SO ₃ none Cl 0.03 S none Cr ₂ O ₃ 0.01 V ₂ O ₅ 0.04 NiO 0.06 BaO 0.18 SrO trace Li ₂ O none Cu none	100.38	3.024

MONCHIQUTE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
12	Camasan Fhais, Argyll, Scotland.	E. G. Radley.	J. J. H. Teall, G. S. Scot. Mem., Sh. 45, p. 128, 1908.	Monchiquite.	
13	Kilchattan, Colonsay Island, Scotland.	E. G. Radley.	J. S. Flett, G. S. Scot. Mem., Sh. 35, p. 46, 1911.	Nephelite ouachitite.	
14	Golden Hill, Monmouthshire, England.	S. J. Johnstone.	W. S. Boulton, Q. J. G. S., LXVII, p. 470, 1911.	Monchiquite.	
15	S. Berge, Alnö, Sweden.	N. Sahlbom.	N. Sahlbom, N. J., II, p. 98, 1897.	Monchiquite.	In W. T., p. 459.
16	Bornwald, Spreudlingen, Odenwald.	L. Walter.	G. Klemm, Nb. Ver. Erdk. (4), XXVIII, p. 34, 1907.	Monchiquite.	
17	Rosenkamm, near Zinkenstein, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XXIX, p. 419, 1910.	Monchiquite.	
18	Taganrog District, Russia.	J. Morozewicz.	J. Morozewicz, Mem. C. G. Rus., No. 8, p. 41, 1903.	Monchiquite.	
19	Taganrog District, Russia.	J. Morozewicz.	J. Morozewicz, Mem. C. G. Rus., No. 8, No. 41, 1903.	Monchiquite.	
20	Taganrog District, Russia.	J. Morozewicz.	J. Morozewicz, Mem. C. G. Rus., No. 8, p. 41, 1903.	Monchiquite.	
21	South Bulli, New South Wales.	H. P. White.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Monchiquite.	
22	Mount Nabo, Wollongong, New South Wales.	J. C. H. Mingaye.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Monchiquite.	
23	Kembla, Wollongong, New South Wales.	W. G. Stone.	Dep. Min. N. S. W. A. R. (1912), p. 198, 1913.	Fourchite.	
24	Murrumburrah, New South Wales.	H. P. White.	Mingaye and White, Rec. G. S. N. S. W., VII, p. 302, 1904.	Leucite monchiquite.	

MONCHIQUE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
25 A1. I	39.35	11.60	3.32	7.38	9.82	12.66	2.00	1.77	3.82	1.28	1.98	0.64	0.21	CO ₂ 4.04 ZrO ₂ none SO ₃ none Cl 0.05 S 0.46 Cr ₂ O ₃ trace V ₂ O ₅ 0.03 NiO 0.01 BaO 0.08 SrO trace Cu none	100.50	2.915
26 A1. I	36.88	4.53	2.03	9.67	25.40	7.61	1.17	0.43	0.82	0.58	2.10	none	0.04	CO ₂ 8.10 ZrO ₂ 0.06 S 0.17 NiO 0.07 BaO none SrO none	99.66	
27 A2. II	40.92	11.34	0.54	12.96	7.78	9.28	3.27	1.94	1.77	0.64	6.57	0.51	0.13	CO ₂ 2.82	100.47	2.95

NEPHELITE BASALT, ETC.

1 A1. I	48.61	20.74	4.29	0.22	2.11	0.25	0.16	0.77	7.07	12.10	3.57	0.29	none	F 0.63 Cr ₂ O ₃ trace BaO none SrO none	100.81	
2 A1. I	35.03	9.80	5.55	4.98	9.78	15.09	2.04	2.16	2.05	0.41	2.20	1.99	0.06	CO ₂ 7.83 ZrO ₂ none SO ₃ none Cl trace FeS ₂ 0.38 BaO 0.14 SrO 0.17	99.66	2.99
3 A2. II	49.07	19.46	2.30	3.50	0.60	3.82	9.25	4.39	5.99		0.64	trace	0.38	CO ₂ trace	99.40	
4 A3. III	41.76	12.61	8.39	7.38	5.23	13.62	2.58	1.19	3.66					CO ₂ 4.49	100.31	
5 A2. II	39.04	12.47	7.89	3.93	8.93	13.84	3.29	1.21	1.75	1.17	1.61	3.98		CO ₂ 0.53 SO ₃ 0.15	99.79	
6 A2. II	45.19	10.49	8.60	5.04	5.97	12.94	2.04	4.09	3.31		1.01		0.50	CO ₂ 0.77 MoS ₂ 0.20	100.15	
7 A3. III	40.39	15.12	10.83	n. d.	8.76	13.84	2.62	1.84	1.46		1.12	1.23	0.20	CO ₂ 1.66 SO ₃ 0.60 Cr ₂ O ₃ trace	99.67	
8 A2. II	39.31	12.39	1.32	11.22	9.43	14.10	2.95	1.89	2.42		0.50	2.30	1.30	CO ₂ 1.23	100.36	3.124
9 A2. II	39.16	10.06	6.54	7.71	13.74	15.30	2.38	1.46	1.55		1.52	0.75	0.11	CO ₂ 0.58 Cr ₂ O ₃ trace	100.86	
10 B2. III	41.80	12.43	6.29	4.84	13.62	10.88	3.40	1.71	2.17		2.15	trace		CO ₂ 0.65 X 0.94 SO ₃ 0.13 Cl trace	101.01	3.011
11 A2. II	39.16	10.06	6.54	7.71	13.74	15.30	2.38	1.46	1.55		1.52	0.75	0.11	CO ₂ 0.58 Cr ₂ O ₃ trace	100.86	3.023
12 A3. III	55.02	18.14	6.03	1.32	2.12	6.67	4.55	4.03	2.08		trace	0.63		SO ₃ none Cl trace	100.59	2.698
13 A2. II	46.88	15.95	3.36	6.37	4.04	9.72	5.04	2.79	3.16		2.31	0.78	0.48	SO ₃ none Cl none	100.88	2.69
14 A2. II	40.20	12.11	7.04	6.61	6.58	13.25	3.58	1.61	2.06		4.73	1.09	0.28	CO ₂ 1.24 SO ₃ 0.34 Cl none	100.72	2.920

MONCHIQUE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
25	Kiama, New South Wales.	H. P. White.	Jaquet, Card, and Harper, Rec. G. S. N. S. W., VIII, p. 50, 1905.	Leucite monchiquite.	
26	Dingo Creek, Nandewar Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 904, 1908.	Monchiquite.	
27	Sheephead Line, Bendigo, Victoria.	F. Stillwell.	F. Stillwell, Pr. R. Soc. Vict., XXV, p. 4, 1912.	Monchiquite.	

NEPHELITE BASALT, ETC.

1	Anna Lee Mine, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. B. 148, p. 162, 1897.	Nephelite basalt.	Altered. In W. T., p. 457.
2	Appie Ellen Shaft, Cripple Creek, Colorado.	W. F. Hillebrand.	W. Cross, U. S. G. S. A. R. 16, II, p. 50, 1896.	Nephelite basalt.	Altered. In W. T., p. 457.
3	Sud Berge, Alnö, Sweden.	N. Sahlbom.	N. Sahlbom, N. J., II, p. 97, 1897.	Nephelinite.	In W. T., p. 303.
4	Hamberg, Neckarelz, Baden.	E. E. Dana.	F. Schälch, G. Sp. Kt. Bad. Bl. Mosbach, p. 32, 1894.	Nephelite basalt.	In W. T., p. 459.
5	Hitzberg, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVIII, p. 40, 1907.	Nephelite basalt.	
6	Rosengärtchen, Heubach, Hesse.	K. Tichauer.	R. Wedel, Jb. Pr. G. L.-A., XI, p. 33, 1892.	Nephelite basalt.	In W. T., p. 341.
7	Russberg, near Darmstadt, Hesse.	E. Becker.	E. Becker, Ref. N. J., I, p. 370, 1906.	Nephelite basalt.	
8	Rosberg, near Darmstadt, Hesse.	E. Becker.	E. Becker, Ref. N. J., I, p. 370, 1906.	Hauyne-nephelite basalt.	
9	Oberleinleiter, Hesse Cassel.	A. Schwager.	Leppla and Schwager, Geog. Jhft., I, p. 69, 1888.	Nephelite basalt.	In W. T., p. 363.
10	Pietzelstein, Rhöngebirge.	E. Möller.	E. Möller, N. J., p. 116, 1888.	Nephelite basalt.	In W. T., p. 345.
11	Oberleinleitner, Fichtelgebirge.	A. Schwager.	Leppla and Schwager, Geog. Jhft., I, p. 69, 1888.	Nephelite basalt.	In W. T., p. 363.
12	Kolmer Scheibe, Bohemia.	R. Pfohl.	J. E. Hibschi, T. M. P. M., XV, p. 258, 1896.	Hauyne tephrite.	In W. T., p. 265.
13	Fuchsberg, near Stankowicz, Bohemia.	F. Hanusch.	Hibschi and Seeman, T. M. P. M., XXXII, p. 87, 1913.	Tephrite.	Zeolitized.
14	Grosspriesen, Bohemia.	F. Hanusch.	J. E. Hibschi, T. M. P. M., XXI, p. 528, 1902.	Hauynophyre.	

NEPHELITE BASALT, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
15 A2. II	39.94	15.87	1.15	9.77	11.36	12.69	3.03	0.87	1.41		2.00	0.82	0.46	CO ₂ 0.54	99.91	2.976
16 A3. III	40.99	16.50	10.62	n. d.	3.29	12.63	5.95	2.36	2.63		2.41	0.89	0.35	SO ₃ 0.64 Cl 0.36	99.62	2.91
17 B2. III	37.17	10.74	5.69	5.94	9.84	14.73	4.22	1.09	2.64	1.63	0.94	1.47	trace	CO ₂ 4.62 Cl 0.04 S 0.21	100.97	
18 A2. II	31.39	12.15	5.89	6.41	9.82	16.61	3.48	1.21	3.17	1.66	1.23	1.40	0.41	CO ₂ 5.31	100.14	
19 A2. II	39.37	16.50	2.28	7.97	4.48	10.22	4.73	3.38	4.77		3.31	0.13	0.06	CO ₂ 0.64 SO ₃ 2.14 Cl 0.09	100.07	2.82
20 A3. III	45.30	17.81	1.70	8.20	6.02	8.51	4.95	2.56	2.75		1.93	trace			99.73	
21 B2. III	43.47	12.60	9.85	3.53	4.11	11.96	3.25	1.74	4.14		2.52	1.04	1.74		99.92	
22 A2. II	37.53	8.35	13.81	5.01	5.94	10.96	3.31	1.99	9.33		1.96		1.02	CO ₂ 1.00	100.21	
23 A1. I	41.40	17.01	2.50	7.74	5.56	7.64	3.93	2.13	2.54	1.72	2.30	0.94	0.10	CO ₂ 4.34 ZrO ₂ none SO ₃ 0.06 Cl trace S trace Cr ₂ O ₃ trace V ₂ O ₅ none NiO none BaO 0.21 SrO trace Cu none	100.12	2.783
24 A2. II	39.92	11.26	4.24	11.01	8.01	8.91	3.18	2.70	2.15	0.40	1.02	0.41	0.11	CO ₂ 6.82 SO ₃ 0.30 V ₂ O ₅ trace	100.44	3.01

IJOLITE.

1 A2. II	38.93	15.41	5.10	4.24	5.57	16.49	5.27	1.78	5.20		1.62	0.35	trace	Cl 0.02 FeS ₂ 0.89 SrO trace Li ₂ O trace	100.57	
2 A2. II	38.11	20.84	5.67	1.46	3.80	14.44	6.65	2.12	4.51	0.57	0.48	0.84	0.14	CO ₂ 0.65 ZrO ₂ 0.18 SO ₃ none S 0.14	100.60	2.769
3 B2. III	36.51	8.22	8.29	3.31	8.19	18.85	2.10	1.08	1.40		3.11		trace	X 2.10 Cl 0.03 FeS ₂ 6.03 SrO trace	99.22	
4 A2. II	46.29	17.47	2.24	7.07	2.10	5.82	8.69	1.47	5.12	0.69	2.37	0.70	0.28	CO ₂ none F trace BaO 0.09	100.40	
5 A2. II	46.58	15.25	7.58	4.70	2.30	4.68	8.93	1.70	4.53	1.91	0.53	1.04	0.10	CO ₂ none	99.83	

LIMBURGITE.

1 A2. II	36.80	4.16	n. d.	8.33	25.98	8.63	0.17	2.48	6.93	0.51	1.26	0.47	0.13	CO ₂ 2.95 SO ₃ 0.06 S 0.95 NiO 0.09 BaO 0.12 SrO trace	100.22	
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NEPHELITE BASALT, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
15	Saubernitz, Bohemia.	F. Hanusch.	J. E. Hirsch, T. M. P. M., XXIX, p. 412, 1910.	Nephelite basalt.	
16	Teufelsmühle, Hochstraden, Styria.	A. Jäger.	A. Sigmund, T. M. P. M., XVI, p. 347, 1897.	Nephelinite.	In W. T., p. 459.
17	Recoaro, Vicentino, Italy.	E. Artini.	E. Artini, R. Inst. Lomb. (2), XL, p. 503, 1907.	Nosean-nephelite basalt.	
18	Poleo-Folgare, Vicentino, Italy.	L. Maddalena.	L. Maddalena, Rend. Ac. Linc., XVII (1), p. 807, 1908.	Nosean-nephelite basalt.	
19	Etinde Volcano, Kamerun.	M. Dittrich.	E. Esch, Sb. Pr. Ak. W., p. 299, 1901.	Hauynophyre.	In W. T., p. 351.
20	Bekinkina, Ambavatovy, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 229, 1903.	Hornblende nephelinite.	Bekinkinite of Rosenbusch.
21	Fort Ternan, Uganda Railway, British East Africa.	M. Goldschlag.	M. Goldschlag, N. J. Ch., p. 596, 1912.	Nephelite basalt.	
22	Karungu, Victoria Nyanza, British East Africa.	M. Goldschlag.	M. Goldschlag, N. J. Ch., p. 595, 1912.	Nephelinite.	
23	Bulli, New South Wales.	W. G. Stone.	G. W. Card, pers. com.	Analcite basalt.	
24	Sapling Flat, Capertee Valley, New South Wales.	J. C. H. Mingaye.	G. W. Card, Rec. G. S. N. S. W., VII, p. 42, 1902.	Nephelite basalt.	

IJOLITE.

1	Magnet Cove, Arkansas.	J. F. Williams.	J. F. Williams, Ig. R. Ark., p. 226, 1891.	Nephelite biotite syenite (ijolite).	In W. T., p. 353.
2	Magnet Cove, Arkansas.	H. S. Washington.	H. S. Washington, J. G., IX, p. 619, 1901.	Biotite ijolite.	In W. T., p. 307.
3	Magnet Cove, Arkansas.	J. F. Williams.	J. F. Williams, Ig. R. Ark., p. 227, 1891.	Dark nephelite syenite (jacupirangite).	In W. T., p. 361.
4	Glenmuir Water, Lugar, Ayrshire, Scotland.	A. Scott.	G. W. Tyrrell, pers. com.	Lugarite.	
5	Barshaw, near Paisley, Renfrewshire, Scotland.	A. Scott.	G. W. Tyrrell, pers. com.	Lugarite.	

LIMBURGITE.

1	Syracuse, New York.	H. N. Stokes.	Darton and Kemp, A. J. S., XLIX, p. 461, 1895.	Limburgite.	In W. T., p. 469.
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LIMBURGITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
2 B2. III	38.34	9.67	4.28	6.37	17.41	10.27	2.87	2.13	3.61		1.64	0.24	0.14	CO ₂ 1.58 SO ₃ 0.54 Cr ₂ O ₃ 0.13	99.22	2.989
3 A2. II	42.16	19.55	3.19	7.86	6.28	10.09	2.19	1.77	3.48	0.61	1.99	0.70		CO ₂ 0.14 SO ₃ 0.07	100.08	
4 A2. II	41.45	11.93	2.79	7.54	15.16	10.14	2.82	0.43	3.50	1.03	2.43	0.54		CO ₂ 0.26 SO ₃ none	100.02	
5 A2. II	41.17	15.60	3.19	7.49	11.84	11.52	2.75	0.46	1.92	0.67	2.47	0.76		CO ₂ 0.63 SO ₃ none	100.47	
6 A2. II	40.66	17.21	4.14	8.21	11.69	9.03	3.34	1.60	0.38	0.14	1.77	0.82		CO ₂ 1.10 SO ₃ 0.16	100.25	
7 A3. III	41.90	13.83	6.27	4.59	13.17	11.40	2.21	0.34	3.87		2.28				99.86	
8 A3. III	41.14	14.28	5.14	6.23	11.05	12.28	2.87	0.80	4.71		2.07				100.57	
9 A3. III	41.32	17.52	6.70	6.23	5.94	12.80	1.69	1.14	5.96			0.61			99.91	
10 B2. II	40.48	16.10	11.20	1.18	9.04	13.21	1.26	2.74	3.26		0.50		0.28		99.25	
11 A3. III	46.76	17.93	5.33	5.62	7.31	8.24	3.53	2.20	1.83		trace			CO ₂ 1.33	100.08	

LEUCITE BASALT, ETC.

1 A1. I	47.98	13.34	4.09	4.24	7.01	9.32	3.51	5.00	2.10		0.58	1.03	trace	CO ₂ 1.24 SO ₃ trace Cl 0.21 BaO 0.50 SrO 0.14	100.29	
2 A1. I	43.62	12.73	4.89	4.10	9.37	11.62	2.96	1.30	3.94	1.91	1.46	0.82	0.12	CO ₂ 0.63 ZrO ₂ 0.02 BaO 0.16 SrO 0.14	99.79	
3 A2. II	51.53	18.28	4.89	2.11	1.69	5.10	3.01	4.74	6.90		1.33	0.46	0.18	S 0.07	100.29	2.554
4 A2. II	50.08	18.87	3.48	3.49	2.14	6.70	4.10	4.58	4.17		1.39	0.39	0.29	CO ₂ 0.26 S 0.04	100.16	2.651
5 A2. II	43.33	13.59	9.09	2.75	6.60	9.00	3.86	0.96	3.30	3.29	3.16	1.18		CO ₂ 0.13 S none	100.24	
6 A2. II	44.16	12.96	8.07	3.10	10.83	12.26	1.92	0.72	2.41	0.46	2.06	1.03			99.98	2.965
7 A2. II	47.61	15.71	8.69	1.35	5.72	10.70	2.56	6.34	0.28		1.14	0.19		Cl 0.20	100.49	
8 A2. II	47.60	16.34	7.15	2.45	5.65	10.25	2.31	5.77	0.31		1.41	0.77		Cl 0.12	100.13	
9 A2. II	47.31	15.10	0.42	3.67	8.55	13.10	3.04	5.92	0.66		0.78	0.06		SO ₃ 0.48 Cl 0.50	99.65	

LIMBURGITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock Name.	Remarks.
2	Kilometer 37, Santa Cruz R. R., Rio Janeiro, Brazil.	F. E. Wright.	F. E. Wright, T. M. P. M., XX, p. 304, 1901.	Limburgite.	
3	Obersteinberg, near Giessen, Hesse.	G. Butzbach.	W. Schottler, Abh. G. L.-A. Darm., IV, p. 452, 1908.	Limburgite.	
4	Dachsberg, near Giessen, Hesse.	K. M. Jene.	W. Schottler, Abh. G. L.-A. Darm., IV, p. 452, 1908.	Limburgite.	
5	Trieb, near Giessen, Hesse.	K. M. Jene.	W. Schottler, Abh. G. L.-A. Darm., IV, p. 452, 1908.	Limburgite.	
6	Staufenberg, near Giessen, Hesse.	G. Butzbach.	W. Schottler, Abh. G. L.-A. Darm., IV, p. 452, 1908.	Limburgite.	
7	Hundskopf, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., 1910, p. 510.	Limburgite.	
8	Dornberg, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., 1910, p. 510.	Limburgite.	
9	Wellemin, Mittelgebirge, Bohemia.	C. F. Eichleifer.	G. Irgang, T. M. P. M., XXVIII, p. 60, 1909.	Limburgite.	
10	Kostelce, near Melnik, Mittelgebirge, Bohemia.	J. Hanusch.	B. Zahalka, Sb. Böhm. Ges. W., 1905, Art. III, p. 57.	Limburgite.	
11	Dorfestein, near Fürstenfeld, Styria.	R. v. Zeynck.	A. Sigmund, T. M. P. M., XVII, p. 534, 1898.	Magmabasalt.	In W. T., p. 283.

LEUCITE BASALT, ETC.

1	Near Highwood Peak, Highwood Mountains, Montana.	H. W. Foote.	L. V. Pirsson, U. S. G. S. B. 237, p. 168, 1905.	Leucite basalt.	In W. T., p. 341.
2	Near Rhyolite, Bullfrog District, Nevada.	G. Steiger.	F. L. Ransome, U. S. G. S. B. 407, p. 60, 1910.	Leucite basanite.	
3	Mondhalde, Kaiserstuhl, Baden.	F. Graeff.	F. Graeff, Ref. N. J., 1890, II, p. 65.	Tephrite (mondhal- deite).	Center of dike. In W. T., p. 271.
4	Mondhalde, Kaiserstuhl, Baden.	F. Graeff.	F. Graeff, Ref. N. J., 1890, II, p. 65.	Tephrite (mondhal- deite).	Border of dike. In W. T., p. 271.
5	Obersteinberg, near Giessen, Hesse.	K. M. Jene.	W. Schottler, Abh. G. L.-A. Darm., IV, p. 456, 1908.	Leucite basanite.	
6	Dobernberg, near Tetschen, Bohemia.	P. Piohl.	J. E. Hibschi, T. M. P. M., XIV, p. 111, 1894.	Leucite basanite.	In W. T., p. 461.
7	Eruption of 1906, Mount Vesuvius, Italy.	Pisani.	A. Lacroix, N. Arch. Mus. (4), IX, p. 104, 1907.	Leucite tephrite.	Meta- morphosed.
8	Eruption of 1906, Mount Vesuvius, Italy.	Pisani.	A. Lacroix, N. Arch. Mus. (4), IX, p. 104, 1907.	Leucite tephrite.	Meta- morphosed.
9	Monte Somma, Italy.	Pisani.	A. Lacroix, N. Arch. Mus. (4), IX, p. 135, 1907.	Leucite tephrite.	Enriched with limestone. Meta- morphosed.

MELILITE ROCKS.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 A3. III	37.91	11.51	2.35	5.38	17.54	13.57	1.75	2.87	9.40		0.23			CO ₂ in H ₂ O	100.51	
2 A1. I	29.24	11.40	5.84	4.74	10.38	18.35	1.44	2.42	5.05	1.04	2.40	2.10	0.15	CO ₂ 5.02 SO ₃ 0.33 Cl trace S 0.17 BaO 0.24 SrO 0.15	100.45	
3 B3. IV	35.25	6.10	8.53	5.60	20.40	7.40	0.70	2.88	10.15		2.25			CO ₂ in H ₂ O	99.26	
4 B3. IV	33.10	7.88	16.71	1.48	13.42	5.25	0.23	0.29	17.85		2.90			CO ₂ in H ₂ O	99.11	
5 A3. III	38.79	14.55	5.67	6.68	7.78	14.65	2.78	2.54	1.99	0.67	0.80			CO ₂ 3.56	100.46	
6 A1. I	40.01	5.41	7.12	1.08	8.89	30.99	0.60	none	2.00	0.52	1.00	0.88	0.11	CO ₂ 1.51 ZrO ₂ none S 0.06 Cr ₂ O ₃ none V ₂ O ₅ none NiO none BaO none SrO 0.21	100.39	3.165
7 A1. I	38.57	5.79	5.41	3.33	8.44	30.72	2.34	0.42	0.62	0.34	1.71	0.83	0.16	CO ₂ 1.23 ZrO ₂ 0.02 Cl none S 0.03 BaO 0.28 SrO 0.35	100.64	
8 A2. II	35.54	11.72	5.86	5.99	13.56	15.83	1.91	2.24	1.67		2.03	0.32		CO ₂ 4.30	100.97	3.052
9 A2. II	33.87	15.25	2.37	5.15	12.52	14.43	1.41	1.02	2.47		2.12	0.99	0.32	CO ₂ 8.64	100.36	3.033
10 A2. II	30.69	10.48	5.76	7.47	11.10	13.25	1.41	1.82	2.88		5.52	0.64	0.55	CO ₂ 8.21	99.78	
11 A2. II	29.25	8.80	3.92	5.42	17.66	17.86	0.77	2.45	2.61		2.54	2.86	trace	CO ₂ 6.00 (F 0.25)	100.29	
12 A2. II	24.19	12.00	6.45	9.32	14.07	17.37	1.99	3.06	5.16		trace	3.96	trace	CO ₂ 2.77 Cl 0.53 S 0.29 Cr ₂ O ₃ trace	101.16	3.15
13 A2. II	32.07	6.40	9.62	0.83	11.50	21.07	1.77	0.58	10.33		2.30	0.83		CO ₂ 2.33	99.63	
14 A2. II	37.14	12.20	4.73	7.74	15.88	12.78	3.50	1.59	1.26		1.64	0.47	0.22	CO ₂ 1.08 SO ₃ 0.23	100.46	
15 A2. II	30.05	9.64	2.12	9.10	16.15	17.65	2.91	1.94	3.72		1.62	0.91	0.99	CO ₂ 3.58 SO ₃ 0.56 Cl trace	100.94	
16 A3. III	27.52	9.48	13.37	n. d.	16.64	16.75	2.38	—	3.37		2.67	1.19		CO ₂ 6.36 S 0.10	100.00	

PYROXENITE.

1 A3. III	53.22	3.14	n. d.	7.95	20.09	14.44	trace	trace	0.98		none		0.11	SO ₃ trace Cl 0.26 Cr ₂ O ₃ 0.23	100.42	
2 A2. II	51.94	2.53	2.88	9.38	25.97	3.60	none	none	2.82		none	none	trace	SO ₃ 0.19 Cl 0.16 Cr ₂ O ₃ 0.60	100.07	

MELILITE ROCKS.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	St. Anne de Bellevue, near Montreal, Quebec.	P. H. le Ros- signol.	F. D. Adams, A. J. S., XLIII, p. 271, 1892.	Alnöite.	In W. T., p. 467.
2	Charles, near Montreal, Canada.	M. F. Connor.	F. D. Adams, Cong. G. Int., XII, Guide 3, p. 46, 1913.	Alnöite.	
3	Manheim, Herkimer County, New York.	C. H. Smyth.	C. H. Smyth, B. G. S. A., IX, p. 262, 1898.	Alnöite.	In W. T., p. 467.
4	Manheim, Herkimer County, New York.	C. H. Smyth.	C. H. Smyth, B. G. S. A., IX, p. 262, 1898.	Alnöite.	In W. T., p. 467.
5	Boring, 1,110 to 1,140 feet deep, Bermuda.	R. C. Wells.	L. V. Pirsson, A. J. S., XXXVIII, p. 341, 1914.	Melilite basalt.	"Mixed with monchiquite."
6	Iron Hill Area, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Melilite rock.	Altered. Cf. No. 1, IV.2.3.3.2.
7	Beaver Creek, Uncompahgre quadrangle, Colorado.	G. Steiger.	E. S. Larsen, U. S. G. S. rec. lab.	Melilite rock.	
8	Naversdale, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edin., XXXIX, p. 897, 1900.	Alnöite.	In W. T., p. 467.
9	Long Geo, Holm, Orkney Islands.	J. S. Flett.	J. S. Flett, Tr. R. Soc. Edin., XXXIX, p. 898, 1900.	Melilite monchiquite.	In W. T., p. 467.
10	Storkalfven, Rödö, Sweden.	H. Santesson.	P. J. Holmquist, Abh. Sv. G. Und., No. 181, p. 86, 1899.	Alnöite.	In W. T., p. 467.
11	Norrwik, Alnö, Sweden.	N. Sahlbom.	N. Sahlbom, N. J., II, p. 100, 1897.	Alnöite.	F calculated. In W. T., p. 467.
12	Stornaset, Alnö, Sweden.	F. Berwerth.	Raimau and Berwerth, Ann. K. K. Nh. Mus., X, p. 76, 1895.	Alnöite.	In W. T., p. 467.
13	Jusiberg, Schwäbische Alb, Bavaria.	E. Gaiser.	E. Gaiser, In. Diss. Bres., p. 36, 1904.	Melilite basalt tuff.	
14	Modlibov, Polzen District, Bohemia.	K. H. Scheumann.	K. H. Scheumann, Abh. Sachs. Ges. W., XXXII, p. 759, 1913.	Polzenite.	
15	Kleinhsaida-Schwojka, Polzen District, Bohemia.	K. H. Scheumann.	K. H. Scheumann, Abh. Sachs. Ges. W., XXXII, p. 759, 1913.	Polzenite.	
16	Devin, Polzen District, Bohemia.	K. H. Scheumann.	K. H. Scheumann, Abh. Sachs. Ges. W., XXXII, p. 760, 1913.	Polzenite.	

PYROXENITE.

1	Dogwood road, Baltimore County, Maryland.	J. E. Whitfield.	G. H. Williams, U. S. G. S. B. 148, p. 83, 1897.	Pyroxenite.	Altered. In W. T., p. 367.
2	Johnny Cake road, Baltimore County, Maryland.	J. E. Whitfield.	G. H. Williams, U. S. G. S. B. 148, p. 83, 1897.	Pyroxenite.	Altered. In W. T., p. 367.

PYROXENITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3 A2. II	50.10	2.00	2.38	8.68	26.85	5.06	none	none	4.16		none	none	0.29	SO ₃ trace Cl 0.25 Cr ₂ O ₃ 0.36	100.14	
4 A2. II	39.74	12.33	4.38	5.17	7.71	17.02	2.05	1.53	3.80		2.34	0.85		CO ₂ 2.79	99.71	2.96
5 A4. IV	37.58	0.57	9.49	n. d.	32.34	0.48	0.32	0.20	6.70	12.64	trace	none	0.28		100.60	
6 A1. I	50.36	2.46	4.26	4.41	20.76	6.15	0.51	0.09	4.07	2.21	trace	trace	0.29	CO ₂ 4.44 ZrO ₂ none SO ₃ none Cl none S none Cr ₂ O ₃ 0.04 V ₂ O ₅ trace NiO 0.31 BaO 0.02 SrO trace	100.38	2.802

PERIDOTITE.

1 A3.	38.24	0.70	3.50	4.25	41.92	0.68	0.20		9.76	0.60						99.85
2 A3. III	38.16	0.63	3.32	4.76	41.84	0.68	0.20		9.63	0.47						99.69
3 A3. III	35.05	0.73	9.05	5.08	33.09	0.54	—	—	8.47					CO ₂ 1.54 Cr ₂ O ₃ 6.74	100.27	
4 A2. II	37.41	2.18	3.64	3.46	41.08	none	0.54	0.41	8.84	0.09	0.12	0.08		CO ₂ 2.03 Cr ₂ O ₃ 0.16	100.04	
5 A1. I	28.04	3.51	n. d.	14.95	21.97	1.78	0.28	0.08	2.54	1.48	0.20	0.04	0.24	CO ₂ 1.01 FeS ₂ 21.53 CuFeS ₂ 1.03 NiS 0.94 CoS 0.03 SrO trace	99.65	
6 A3. III	20.89	6.93	17.81	26.04	15.65	0.96	trace	none	0.42		10.00					99.26
7 A4. IV	19.98	6.75	19.25	21.42	16.83	lost	trace	trace	4.77		9.76					99.32
8 B2. III	28.83	2.94	3.60	5.13	24.31	11.24	0.75	1.31	3.96	0.83	5.67	0.77		CO ₂ 11.64	100.98	
9 A2. II	43.87	1.64	8.94	2.60	27.32	6.29	0.50		7.64	1.08	0.12	trace	0.19	Cr ₂ O ₃ 0.44 NiO trace	100.63	3.022
10 A2. II	39.20	4.60	3.45	6.15	31.65	3.23	0.42	0.14	9.38	0.50	0.52	trace	0.20	Cr ₂ O ₃ 0.41 NiO 0.30 Li ₂ O trace	100.15	
11 A3. III	34.50	14.37	2.85	4.46	21.81	11.43	0.51	7.50	7.14			0.77		CO ₂ 0.21 SO ₃ 6.60	100.15	
12 A1. I	33.84	5.88	7.04	5.16	22.96	9.46	0.33	2.04	1.50	0.68	3.78	0.89	0.16	CO ₂ 0.43 Cl 0.05 Cr ₂ O ₃ 0.18 NiO 0.10 CoO trace BaO 0.06	100.54	

PYROXENITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	Johnny Cake road, Baltimore County, Maryland.	J. E. Whitfield.	G. H. Williams, U. S. G. S. B. 148, p. 83, 1897.	Pyroxenite.	Altered. In W. T., p. 367.
4	Tan K'ar-thing, Shalakuto River, Nan Shan, China.	C. Pfeil.	K. Futterer, Durch Asien, III (4), p. 23, 1911.	Augitite.	
5	Ilocos Norte, Lazon, Philippine Islands.	L. A. Salinger.	W. D. Smith, Phil. J. Sci. (A), II, p. 151, 1907.	Pyroxenite.	
6	Newtons Basin, Nepean River, New South Wales.	J. C. H. Mingaye.	Dep. Min. N. S. W. A. R. (1908), p. 184, 1909.	Diallage rock.	Inclusion in basalt.

PERIDOTITE.

1	Ireland, Megantic County, Quebec.	M. F. Connor.	J. A. Dresser, Can. G. S. rec. lab.	Dunite.	
2	Blacklake station, Megantic County, Quebec.	M. F. Connor.	J. A. Dresser, Can. G. S. rec. lab.	Dunite.	
3	Northeast Bay, Lake Abitibi, Ontario.	A. T. White.	M. B. Baker, Rep. Bur. Min. Ont., XVIII (I), p. 274, 1909.	Peridotite.	
4	Bayville, Boothbay quadrangle, Maine.	M. W. Adams.	I. H. Ogilvie, An. N. Y. Ac. Sci., XVII p. 547, 1907.	Dunite.	
5	Union, Knox County, Maine.	W. F. Hillebrand.	E. S. Bastin, J. G., XVI, p. 134, 1903.	Pyrrhotite peridotite.	
6	Iron Mine Hill, Cumberland, Rhode Island.	C. H. Warren.	Johnson and Warren, A. J. S., XXV, p. 33, 1908.	Cumberlandite.	"Chloritic alteration." Cf. No. 1, V.3.5.1.3.
7	Iron Mine Hill, Cumberland, Rhode Island.	C. H. Warren.	Johnson and Warren, A. J. S., XXV, p. 33, 1908.	Cumberlandite.	"CaO very small." Serpentine alteration. Cf. No. 1, V.3.5.1.3.
8	Gates, near Masontown, Fayette County, Pennsylvania.	M. W. Adams.	Kemp and Ross, An. N. Y. Ac. Sci., XVII, p. 517, 1907.	Peridotite.	
9	Johnny Cake road, Baltimore County, Maryland.	T. M. Chatard.	G. H. Williams, Am. G., VI, p. 39, 1890.	Lherzolite.	In W. T., p. 367.
10	Ilchester, Howard County, Maryland.	W. F. Hillebrand.	G. H. Williams, U. S. G. S. A. R. 15, p. 674, 1895.	Cortlandtite.	In W. T., p. 357.
11	Marion, Crittenden County, Kentucky.	L. G. Eakins.	J. S. Diller, U. S. G. S. B. 148, p. 94, 1897.	Mica peridotite.	In W. T., p. 469.
12	Flanary dike, Crittenden County, Kentucky.	W. F. Hillebrand.	J. S. Diller, A. J. S., XLIV, p. 288, 1892.	Mica peridotite.	In W. T., p. 363.

PERIDOTITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13 A1. I	29.81	2.01	5.16	4.35	32.41	7.69	0.11	0.20	8.92		2.26	0.35	0.23	CO ₂ 6.66 SO ₃ 0.28 Cr ₂ O ₃ 0.43 NiO 0.05	100.86	2.781
14 A3. III	29.43	2.36	n. d.	9.46	31.66	6.94	0.78	0.65	10.90		1.48	trace		CO ₂ 5.65 SO ₃ 0.30 Cr ₂ O ₃ 0.14	100.15	2.697
15 A2. II	39.37	4.47	4.96	9.13	26.53	3.70	0.50	0.26	7.08	0.87	0.66	0.17	0.12	CO ₂ 1.23 Cr ₂ O ₃ 0.68 BaO trace SrO trace	99.94	
16 A2. II	37.36	4.76	6.61	6.12	31.11	1.19	trace	trace	10.37	0.65	0.79	0.06	trace	CO ₂ none Cr ₂ O ₃ 0.62 NiO 0.04	99.68	
17 A3. III	47.92	5.69	5.99	0.84	21.82	3.16	0.29	1.43	9.49		2.71			CO ₂ 0.49	99.83	
18 A3. III	38.78	6.85	8.83	1.99	26.34	3.88	0.78	2.56	7.85	1.95	0.89			CO ₂ 0.14	100.84	2.317
19 A2. II	41.36	1.21	9.18	n. d.	42.90	1.34	0.04	0.04	1.94	0.16	none	0.04	0.10	CO ₂ 1.40 S 0.50 Cr ₂ O ₃ 0.15 NiO 0.15 BaO none SrO none	100.51	3.160
20 A2. II	40.25	1.10	4.61	3.04	37.91	1.16	0.48	0.16	9.08	0.32	trace		0.11	CO ₂ 1.95 Cr ₂ O ₃ 0.15	100.32	2.868
21 A1. I	38.40	0.29	3.42	6.69	45.23	0.35	0.08		4.11	0.24	none	trace	0.24	CO ₂ 1.10 ZrO ₂ none S 0.06 Cr ₂ O ₃ 0.07 NiO 0.10 BaO none SrO none	100.38	
22 A3. III	33.48	1.50	7.27	1.36	42.02	0.02	0.29		13.26	0.60			0.06		99.86	
23 A1. I	44.81	1.88	1.98	4.52	30.91	6.58	0.15		6.88	0.15	none	0.02	0.13	CO ₂ 1.79 Cr ₂ O ₃ 0.29 NiO 0.09 BaO none SrO none	100.18	
24 A2. II	43.17	11.42	4.97	6.36	16.97	11.62	1.11	0.10	2.51	0.22	1.23	0.04	0.14	CO ₂ 0.71 S 0.06	100.63	
25 A1. I	44.73	11.89	4.85	6.61	10.77	7.69	2.77	0.89	4.15	3.49	1.53	0.46	0.41	Cl none S 0.05 Cr ₂ O ₃ 0.05 V ₂ O ₅ 0.03 NiO 0.03 BaO 0.03	100.43	
26 A1. I	41.01	5.00	5.52	8.66	26.92	4.43	0.98	0.25	4.95	0.43	0.66	0.10	0.47	CO ₂ 0.76 S none Cr ₂ O ₃ 0.14 V ₂ O ₅ 0.03 NiO 0.17 CoO 0.05 CuO trace	100.53	
27 A3. III	42.87	10.93	3.44	10.14	16.27	9.11	0.92	0.13	2.87	0.57	trace	trace	trace	CO ₂ 2.72	99.95	2.88
28 A1. I	36.41	6.53	3.02	8.18	26.88	4.47	0.02	none	3.57	0.63	0.88	0.19	0.47	CO ₂ 8.26 FeS ₂ none Cr ₂ O ₃ 0.35 V ₂ O ₅ 0.07 NiO 0.10 BaO none CuO trace	100.03	
29 A3. III	46.16	5.83	10.96	2.27	21.10	6.73	0.84	0.68	4.79			trace	0.16	CO ₂ 0.38	99.90	

PERIDOTITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	Willard, Elliott County, Kentucky.	T. M. Chatard.	J. S. Diller, A. J. S., XXXII, p. 125, 1886.	Peridotite.	Also in U. S. G. S. B. 38, p. 24, 1887. In W. T., p. 471.
14	Willard, Elliott County, Kentucky.	Peter and Kastle.	J. S. Diller, U. S. G. S. B. 38, p. 24, 1887.	Peridotite.	In W. T., p. 471.
15	Opin Lake, Marquette region, Michigan.	W. F. Hillebrand.	Van Hise and Bayley, U. S. G. S. A. R. 15, p. 511, 1895.	Peridotite.	In W. T., p. 361.
16	Crystal Falls, Michigan.	H. N. Stokes.	J. M. Clements, U. S. G. S. Mon. 36, p. 219, 1899.	Picrite porphyry.	In W. T., p. 471.
17	Murfreesboro, Pike County, Arkansas.	H. S. Washington.	Unpublished.	Peridotite (kimberlite).	"Green ground." Altered. Diamond- bearing.
18	Murfreesboro, Pike County, Arkansas.	R. N. Brackett.	J. F. Williams, Ig. R. Ark., p. 383, 1891.	Peridotite (kimberlite).	Diamond- bearing. In W. T., p. 363.
19	MacRae Creek, Rossland Mountains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 335, 1912.	Dunite.	
20	Rock Creek, Midway Mountains, British Columbia.	M. Dittrich.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 394, 1912.	Dunite.	
21	Eagle Creek and Tulameen River, British Columbia.	W. F. Hillebrand.	J. F. Kemp, U. S. G. S. B. 193, p. 44, 1903.	Dunite.	In W. T., p. 369.
22	Olivine Mountain, Tulameen District, British Columbia.	M. F. Connor.	C. Camsell, Can. G. S. Mem. 26, p. 53, 1913.	Peridotite.	
23	Strawberry Valley, Butte County, California.	W. F. Hillebrand.	H. W. Turner, J. G., III, p. 403, 1895.	Peridotite.	Also in U. S. G. S. A. R. 17, 1, p. 735, 1896. In W. T., p. 471.
24	Sequoia Post Office, Yosemite National Park, California.	G. Steiger.	H. W. Turner, U. S. G. S. B. 228, p. 242, 1904.	Amphibole picrite.	
25	Blackburn, Linlithgowshire, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot. Mem., Sh. 32, p. 300, 1910.	Picrite.	
26	Dunan Liath, Rosshire, Scotland.	W. Pollard.	J. S. Flett, G. S. Scot. Mem., Sh. 93, p. 127, 1912.	Peridotite.	
27	Ty Croes, Anglesey, Wales.	J. A. Phillips.	T. G. Bonney, Q. J. G. S., XXXIX, p. 254, 1883.	Hornblende picrite.	In W. T., p. 355.
28	Polyphant, Lewannick, Cornwall.	E. G. Radley.	H. Dewey, G. S. Eng. Mem., Sh. 337, p. 65, 1911.	Hornblende picrite.	
29	Schriesheim, Baden.	M. Dittrich.	M. Dittrich, Mt. Bad. G. L.-A., V, p. 6, 1907.	Schriesheimite (amphibole picrite).	Weathered. Cf. No. 2, IV.1.3.2.1.

PERIDOTITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
30 A2. II	36.58	3.69	11.16	4.10	30.68	2.58	0.25	0.20	8.45	0.64	0.26	0.77		CO ₂ 0.31 SO ₃ 0.23	99.90	
31 A1. I	39.07	9.95	5.15	10.37	19.19	6.29	0.97	0.19	7.65		0.68	0.13	0.17	CO ₂ 0.09 S 0.15 Cr ₂ O ₃ 0.05 NiO 0.02 CuO 0.16	100.28	
32 A2. II	34.66	11.63	5.40	5.75	21.36	4.59	0.30	0.12	8.08	4.07	2.99	0.80		CO ₂ 0.20 SO ₃ 0.19	100.14	2.53
33 B2. III	42.57	4.58	7.71	7.31	22.16	5.24	0.45		7.64		1.50	0.16	trace		99.32	
34 B2. III	40.81	4.35	9.10	6.54	24.56	4.67	0.63		7.26		1.08	0.06	0.29		99.35	
35 A2. II	38.35	7.03	6.82	8.68	25.69	0.12	0.40	0.45	10.89		0.90	0.12		SO ₃ 0.22	99.67	2.73
36 A2. II	40.80	3.21	2.84	13.45	27.83	3.04	0.13	0.12	5.67		0.34	0.11		CO ₂ 2.04 FeS ₂ 0.45	100.03	
37 A3. III	39.42	1.62	4.70	4.73	34.19	1.56	n. d.	n. d.	12.29				0.89	CO ₂ 0.37 Spinel 0.47	100.23	2.86
38 A3. III	38.82	0.39	3.32	4.08	43.45	trace	0.08	0.09	8.47	1.13	0.15			SO ₃ trace Cr ₂ O ₃ 3.32 Org. 0.11	103.41 (100.04)	2.819
39 A3. III	41.35	13.90	8.24	7.13	8.79	11.65	0.15	0.16	5.35		0.22			CO ₂ 2.70	99.64	
40 A3. III	40.65	12.85	4.88	8.30	18.05	8.05	1.38	0.91	2.70			0.64		CO ₂ 2.30	100.71	
41 A3. III	39.75	14.40	7.58	8.57	6.17	12.65	0.81	0.28	2.15			0.71		CO ₂ 6.50	99.57	
42 A3. III	39.05	13.95	8.16	6.25	8.89	14.02	0.55	0.89	2.95			0.55		CO ₂ 5.10	100.36	
43 A3. III	42.54	7.96	4.78	8.64	19.79	6.04	2.57	0.99	5.88		trace	0.09		CO ₂ 0.56	99.84	
44 A3. III	43.47	2.97	4.42	4.48	39.44	3.30	n. d.	n. d.	1.87		0.15		trace	Cr ₂ O ₃ 0.43	100.53	
45 A2. II	39.88	3.83	3.16	5.02	30.99	2.41	1.10	0.68	8.20	2.28	0.03	trace		CO ₂ 2.04 S 0.10 Cr ₂ O ₃ 0.20 NiO 0.20	100.12	
46 A2. II	39.95	2.41	5.95	2.80	36.10	1.03	0.38	trace	10.13	0.57	trace	trace	0.13	CO ₂ trace S 0.12 Cr ₂ O ₃ 0.05 NiO 0.16	99.78	
47 A4. IV	42.66	6.26	6.89	2.78	24.64	8.02	2.88	n. d.	6.34						100.47	
48 A4. IV	38.06	0.31	6.72	5.29	39.91	0.52	n. d.	n. d.	8.35					Cr ₂ O ₃ 1.39	100.55	

PERIDOTITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
30	Nieder Beerbach, Rossdorf, Hesse.	Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 29, 1912.	Peridotite.	
31	Sechsheldon, Dillenburg, Hesse Nassau.	L. Doermer.	L. Doermer, N. J. B. B., XV, p. 609, 1902.	Amphibole picrite.	
32	Steinperf, Hesse Nassau.	G. Butzbach.	R. Brauns, N. J. B. B., XXVIII, p. 407, 1909.	Picrite porphyrite.	
33	Lauterbach, Vogtland, Saxony.	A. Uhlemann.	A. Uhlemann, T. M. P. M., XXVIII, p. 430, 1909.	Picrite.	
34	Pausa, Vogtland, Saxony.	A. Uhlemann.	A. Uhlemann, T. M. P. M., XXVIII, p. 426, 1909.	Picrite.	Contact with diabase.
35	Stoppenberg, Harz.	K. Hampe.	E. Dathe, Jb. Pr. G. L.-A., IX, p. 327, 1889.	Paleopicrite.	In W. T., p. 471.
36	Leuthen, Laudeck, Silesia.	A. Lindner.	E. Dathe, Jb. Pr. G. L.-A., XIX, p. 127, 1899.	Actinolite- olivine rock.	
37	Kottschenberg, Silesia.	H. Traube.	H. Traube, Ref. N. J., I, p. 241, 1885.	Olivine diאלage rock (wehrnite).	In W. T., p. 471.
38	Habendorf, Silesia.	K. Hampe.	E. Dathe, Jb. Pr. G. L.-A., IX, p. 327, 1889.	Peridotite.	In W. T., p. 471.
39	Stranik, Hotzendorf, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXX, p. 76, 1896.	Picrite.	In W. T., p. 471.
40	Sohle, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXX, p. 76, 1896.	Picrite porphyry.	In W. T., p. 471.
41	Mtschenowitz, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXX, p. 75, 1896.	Picrite.	In W. T., p. 471.
42	Zamrsk, near Keltch, Moravia.	C. F. Eichleiter.	C. F. Eichleiter, Vh. G. R.-A. Wien, XXX, p. 74, 1896.	Picrite.	In W. T., p. 471.
43	Tomasead, Hunyad, Hungary.	K. Emszt.	P. Rozlozsnik, F. K., XXXV, p. 519, 1905.	Feldspar picrite.	
44	Gorduno Valley, near Bellinzona Piedmont.	L. Hezner.	U. Grubenmann, Vrt. Jhft. Ges. Zür., LIIL, p. 10, 1908.	Olivine- garnet rock.	Meta- morphosed. Cf. No. 44, V.1.4.1.1.
45	Grotta d'Oggi, San Piero in Campo Elba.	G. d'Achiardi.	G. d'Achiardi, Mem. A. d'Ach., p. 125, 1903.	Anthophyllite peridotite.	
46	Naravet-Keu, Samoyed Urals.	M. Dittrich.	H. Backlund, Mem. Imp. Ac. Sci. St. P., XXVIII, No. 3, p. 41, 1912.	Harzburgite.	
47	Suprega, Ural Mountains.	Kultacheff and Loewinson- Lessing.	Loewinson-Lessing, Jushno-Saask., p. 166, 1900.	Picrite.	In W. T., p. 361
48	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord., I, p. 163, 1902.	Dunite.	

PERIDOTITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
49 A3. III	35.70	0.75	4.29	5.38	43.34	—	—	—	9.35		0.21		0.26	Cr ₂ O ₃ —	99.86	
50 A2. II	40.07	8.95	4.82	7.81	13.86	13.83	1.34	0.56	2.45		2.35	0.35		CO ₂ 3.78 S 0.04	100.21	3.096
51 A2. II	35.12	0.56	8.49	3.78	39.72	0.87	0.16	0.08	10.86		0.09	0.08			99.81	
52 A2. II	46.83	3.71	3.24	4.35	21.33	3.83	0.63	0.70	5.22	7.95	1.34	0.74			99.87	2.62
53 A2. II	38.29	2.66	5.77	2.93	29.46	2.42	0.30	1.03	10.19	3.13	2.00	1.44		CO ₂ 0.20	99.82	2.68
54 A2. II	38.15	1.19	6.55	3.24	27.33	4.13	0.25	0.56	9.69	3.52	1.72	2.15		CO ₂ 1.41	99.89	2.64
55 A2. II	38.02	3.03	8.13	2.21	27.78	4.80	0.84		10.11	2.60	2.30	0.41		CO ₂ 0.28	100.51	2.695
56 A3. III	33.84	6.16	27.40	0.19	21.62	n. d.	0.20		9.33	1.23	0.43			Cr ₂ O ₃ 0.04	100.44	2.757
57 A2. II	32.03	2.90	6.12	3.40	33.49	7.60	0.35	1.34	6.31	0.51	1.73	1.45		CO ₂ 2.50 BaO 0.06	99.73	
58 B2. III	30.95	4.02	6.16	2.66	32.30	8.92	0.35	1.61	6.81	0.55	2.34	0.15	trace	CO ₂ 2.54 NiO trace	99.36	2.835
59 A2. II	30.32	2.74	4.50	4.09	29.64	10.40	0.45	0.75	6.56	1.19	1.78	1.34		CO ₂ 6.21 BaO 0.04	99.97	
60 A2. II	29.56	2.47	4.18	4.84	37.47	7.19	0.22	0.33	4.82	0.43	1.18	0.43	trace	CO ₂ 6.71 NiO 0.30	100.18	2.85
61 B2. III	38.08	2.46	24.48	2.59	12.88	4.14	1.12	0.84	10.14	0.25	none	0.67	trace	CO ₂ 1.67 S trace Cr ₂ O ₃ trace	99.32	
62 A2. II	36.57	5.09	13.75	4.68	11.85	8.49	2.55	0.64	6.31	5.47	none	0.58	none	CO ₂ 4.61 S trace Cr ₂ O ₃ trace	100.59	
63 B2. III	33.42	0.94	23.84	3.52	10.80	9.84	0.97	0.86	7.83	0.43	none	0.89	none	CO ₂ 5.88 S trace Cr ₂ O ₃ trace	99.22	
64 A2. II	36.00	0.69	4.44	2.90	39.70	3.58	0.11	0.26	8.02	0.63	0.58	0.64		CO ₂ 2.74	100.29	2.98
65 A2. II	35.49	3.42	6.37	3.02	30.98	5.12	0.20	2.61	6.69	0.47	1.65	0.63	trace	CO ₂ 3.03 S trace NiO trace	99.68	2.923
66 A2. II	31.80	3.41	5.19	3.48	24.69	10.04	0.29	4.32	5.59	0.63	1.40	1.49		CO ₂ 7.65	99.98	
67 A2. II	46.30	6.41	9.13	2.24	17.82	13.02	0.98	0.37	1.78	0.21	0.58		0.21	CO ₂ 0.93	99.98	

PERIDOTITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
49	Krebet-Salatim, Ural Mountains.	Not stated.	Duparc and Wunder, C. R., CLII, p. 884, 1911.	Dunite.	
50	Ribeira de Massapez, Madeira.	Klüss.	C. Gagel, Z. D. G. G., LXIV, p. 399, 1912.	Madeirite (essexitic peridotite).	
51	Riviere du Mat, Reunion.	Boiteau.	A. Lacroix, C. R., CLV, p. 539, 1912.	Dunite.	
52	Premier Pipe, Elandsfontein, Pretoria, Transvaal.	M. Dittrich.	P. A. Wagner, Tr. G. Soc. S. Afr., XIV, p. 53, 1911.	Kimberlite.	"Blue ground."
53	Premier Pipe, Elandsfontein, Pretoria, Transvaal.	M. Dittrich.	P. A. Wagner, Tr. G. Soc. S. Afr., XIV, p. 53, 1911.	Kimberlite.	
54	Premier Pipe, Elandsfontein, Pretoria, Transvaal.	M. Dittrich.	P. A. Wagner, Tr. G. Soc. S. Afr., XIV, p. 53, 1911.	Kimberlite tuff.	
55	Premier Pipe, Elandsfontein, Pretoria, Transvaal.	P. A. Wagner.	P. A. Wagner, Diam. Gest. S. Afr., p. 76, 1909.	Kimberlite.	"Blue ground."
56	Schuller mine, Pretoria, Transvaal.	C. Gardthausen.	Kymaston and Hall, Rep. S. Afr. A. A. S., p. 194, 1904.	Kimberlite.	"Blue ground."
57	De Beer's mine, Kimberley, Griqualand.	M. Dittrich.	P. A. Wagner, Tr. G. Soc. S. Afr., XIV, p. 53, 1911.	Kimberlite.	
58	De Beer's mine, Kimberley, Griqualand.	P. A. Wagner.	P. A. Wagner, Diam. Gest. S. Afr., p. 63, 1909.	Kimberlite.	"P ₂ O ₅ low." Cf. Wagner, Diam. Flds., S. Afr., p. 84, 1914.
59	De Beer's mine, Kimberley, Griqualand.	M. Dittrich.	P. A. Wagner, Tr. G. Soc. S. Afr., XIV, p. 53, 1911.	Kimberlite.	
60	St. Augustine's mine, Kimberley, Griqualand.	M. Dittrich.	P. A. Wagner, Diam. Flds. S. Afr., p. 84, 1914.	Kimberlite.	
61	Vogelfontein mine, Transvaal.	Not stated.	H. S. Harger, Tr. G. Soc. S. Afr., VIII, p. 120, 1905.	Kimberlite.	"Hardibank."
62	Vogelfontein mine, Transvaal.	Not stated.	H. S. Harger, Tr. G. Soc. S. Afr., VIII, p. 120, 1905.	Kimberlite.	"Blue ground."
63	Vogelfontein mine, Transvaal.	Not stated.	H. S. Harger, Tr. G. Soc. S. Afr., VIII, p. 120, 1905.	Kimberlite.	"Hardibank."
64	Klipfontein, Orange River Colony.	M. Dittrich.	P. A. Wagner, Tr. G. Soc. S. Afr., XIV, p. 53, 1911.	Kimberlite.	
65	Lion Hill mine, Smaldeel, Orange River Colony.	P. A. Wagner.	P. A. Wagner, Diam. Gest. S. Afr., p. 85, 1909.	Kimberlite.	
66	Lion Hill dike, Smaldeel, Orange River Colony.	M. Dittrich.	P. A. Wagner, Diam. Flds. S. Afr., p. 110, 1914.	Kimberlite.	
67	Rybnaja River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 429, 1910.	Picrite.	

PERIDOTITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
68 A2. II	41.50	10.88	12.14	1.28	17.82	7.71	0.61	0.56	5.81	0.31	0.62		0.12	CO ₂ 0.23	99.59	
69 A2. II	38.04	7.01	6.59	6.48	20.17	4.40	0.17	0.12	7.70		0.40			CO ₂ 0.93 Cr ₂ O ₃ 7.42	99.43	
70 A3. III	39.16	3.76	4.32	3.55	38.15	2.03	0.70	—	8.27	0.73					100.72	2.88
71 A1. I	39.91	13.67	6.55	8.98	11.96	6.18	1.28	0.66	3.74	3.66	1.75	0.61	0.18	CO ₂ 0.40 SO ₃ trace Cl 0.02 S 0.20 Cr ₂ O ₃ 0.21 V ₂ O ₅ trace NiO trace BaO none SrO none Li ₂ O none	99.96	2.891
72 A2. II	39.13	3.48	1.83	7.58	42.15	0.07	—	—	0.80	2.80	0.16		0.21	CO ₂ 3.05 Cr ₂ O ₃ 0.20 NiO 0.04	100.75	
73 A1. I	41.43	5.92	4.03	7.46	27.49	4.31	0.35	0.64	6.47	0.32	0.60	0.24	0.42	CO ₂ 0.38 SO ₃ none Cl trace Cr ₂ O ₃ 0.31 NiO 0.03	100.50	2.931
74 A2. II	31.07	5.49	1.49	7.64	17.49	5.46	3.82	0.11	0.05	0.07	0.26		0.18	CO ₂ 27.24	100.43	2.89
75 A2. II	38.37	1.51	2.08	4.82	41.41	none	0.10		11.11		0.05		0.35	Cr ₂ O ₃ 0.20	100.00	

ORES, ETC.

1 A2. II	33.89	0.94	6.85	22.73	6.85	9.68	0.37	0.34	1.66	0.32	12.97	3.29	0.31	CO ₂ trace Cl 0.01 F 0.02	100.23	
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PERIDOTITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
68	Rybnaja River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 429, 1910.	Picrite.	
69	Riasanov trail, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 424, 1910.	Wehrlite.	
70	Batan Island, Philippine Islands.	Survey laboratory.	W. D. Smith, Min. Bur. Manila B. 5, p. 20, 1905.	Peridotite.	
71	Jellore Creek, Mittagong, New South Wales.	D. Mawson.	Taylor and Mawson, Pr. R. Soc. N. S. W., XXXVII, p. 341, 1903.	Picrite.	
72	Dundas, near Sydney, New South Wales.	W. N. Benson.	W. N. Benson, Pr. R. Soc. N. S. W., XLIV, p. 532, 1910.	Dunite.	
73	Frenchmans Gulley, Walhalla, Victoria.	Not stated.	Secy. Min. Vict. A. R. (1907), p. 63, 1908.	Peridotite.	
74	Hannans Lake, Kalgoorlie, Western Australia.	C. G. Gibson.	E. S. Simpson, W. Aust. G. S. B. 6, p. 75, 1902.	Peridotite.	
75	Lee River, Dun Mountains, Nelson, New Zealand.	Not stated.	J. M. Bell, G. S. N. Z. B. 12, p. 37, 1911.	Harzburgite.	

ORES, ETC.

1	Lovington, Nelson County, Virginia.	W. M. Thornton.	Watson and Taber, Va. G. S. B. III A, p. 135, 1913.	Hornblende nelsonite.	
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PART IV.—INFERIOR ANALYSES.

GRANITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	McLaren Bay, Lake Keepawa, Quebec.	F. G. Wait.	G. C. Hoffmann, Can. G. S. A. R. IX, p. 19 R, 1898.	Granitite gneiss.	In W. T., p. 373.
2	Lake Wicksteed, Quebec.	F. G. Wait.	G. C. Hoffmann, Can. G. S. A. R. IX, p. 19 R, 1898.	Granite gneiss.	In W. T., p. 159.
3	Bad Vermilion Lake, Rainy River District, Ontario.	W. Lawson.	A. P. Coleman, J. G., IV, p. 909, 1896.	Granite.	In W. T., p. 137.
4	Sultana Island, Ontario.	R. M. Rosebrugh.	A. P. Coleman, Rep. Bur. Min. Ont., VI, p. 122, 1897.	Granite.	Not in W. T.
5	Sudbury, Ontario.	T. L. Walker.	T. L. Walker, Q. J. G. S., L III, p. 56, 1897.	Granite.	In W. T., p. 375.
3	Blue Hill, Hancock County, Maine.	H. J. Williams	W. C. Day, U. S. G. S. A. R. 19, VI, p. 215, 1898.	Granite.	In W. T., p. 373.
7	Blue Hill, Hancock County, Maine.	Ricketts and Banks.	W. C. Day, U. S. G. S. A. R. 18, V, p. 962, 1897.	Granite.	In W. T., p. 373.
8	Waldoboro, Lincoln County, Maine.	Ricketts and Banks.	W. C. Day, U. S. G. S. A. R. 20, VI, p. 391, 1899.	Granite.	In W. T., p. 373.
9	Jonesboro quarry, Washington County, Maine.	Ricketts and Banks.	T. N. Dale, U. S. G. S. B. 313, p. 170, 1907.	Granite.	
10	North Jay, Maine.	E. T. Rodgers.	W. C. Dale, U. S. G. S. A. R. 19, VI, p. 219, 1898.	Granite.	In W. T., p. 373.
11	Hurricane Island, Knox County, Maine.	Ricketts and Banks.	T. N. Day, U. S. G. S. B. 313, p. 137, 1907.	Granite.	
12	Damaris Cove Island, Boothbay, Maine.	M. W. Adams.	I. H. Ogilvie, Ann. N. Y. Ac. Sci., XVII, p. 531, 1907.	Granite.	
13	Mason, Hillsboro County, New Hampshire.	Ricketts and Banks.	W. C. Day, U. S. G. S. A. R. 20, VI, p. 418, 1899.	Granite.	In W. T., p. 373.
14	Redstone, Carroll County, New Hampshire.	F. C. Robinson.	W. C. Day, U. S. G. S. A. R. 20, VI, p. 417, 1899.	Granite.	In W. T., p. 373.
15	Redstone, Carroll County, New Hampshire.	F. C. Robinson.	W. C. Day, U. S. G. S. A. R. 20, VI, p. 417, 1899.	Granite.	In W. T., p. 373.
16	Milford, Massachusetts.	C. F. Chandler.	W. C. Day, U. S. G. S. A. R. 19, VI, p. 221, 1898.	Granite.	In W. T., p. 373.
17	Quincy, Massachusetts.	E. A. Angell.	W. C. Day, U. S. G. S. A. R. 19, VI, p. 229, 1898.	Granite.	Cf. Nos. 25, 26, 27, I. 4.1.3. In W. T., p. 373.
18	Milford, Massachusetts.	R. H. Richards.	T. N. Dale, U. S. G. S. B. 354, p. 81, 1908.	Granite.	
19	Westerly, Rhode Island.	F. W. Love.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	Na ₂ O by difference. In W. T., p. 373.
20	Westerly, Rhode Island.	F. W. Love.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	Na ₂ O by difference. In W. T., p. 373.
21	Stony Creek, Connecticut.	L. P. Kinnicut.	J. F. Kemp, B. G. S. A., X, p. 375, 1899.	Granite.	In W. T., p. 373.

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
22 B4. V	68.11	14.28	n. d.	2.63	0.68	1.86	6.57	5.46	n. d.					S 0.34	99.93	
23 B3. IV	75.61	12.53	2.22	0.86	0.20	1.35	5.21	3.18	0.09						101.25	
24 B3. IV	73.54	15.20	0.50	0.81	0.03	1.69	4.99	2.31	0.06	—	0.08				99.21	
25 B3. IV	63.19	10.50	10.97	1.51	1.44	6.12	1.92	4.02	0.19						99.86	
26 B4. V	67.98	16.14	n. d.	4.39	0.53	5.89	4.32	0.45	0.30						100.00	
27 C4. V	64.12	20.91	2.96	n. d.	0.66	1.98	4.57	4.82							100.02	
28 C4. V	77.25	8.18	8.17	n. d.	0.39	0.70	1.22	0.01					1.82		99.79	
29 B4. V	75.14	8.61	7.49	n. d.	0.04	0.93	5.82	2.57	none				trace		100.60	
30 B4. V	70.70	16.50	2.34	n. d.	0.29	2.96	4.56	2.45	none					FeS ₂ 0.09	99.89	
31 B4. V	66.01	17.44	5.62	n. d.	1.11	1.44	5.06	3.16	none					MnO 0.23	100.07	
32 C4. V	73.66	15.39	1.24	n. d.	0.38	1.36	0.55	6.89	n. d.						99.07	2.62
33 C4. V	72.22	14.51	n. d.	n. d.	0.58	1.32	3.21	4.30	0.52		0.24	trace	trace		99.70	2.63
34 D4. V	71.20	17.04	3.48	n. d.	0.11	n. d.	2.32	4.70	0.63						99.48	
35 C4. V	69.74	13.72	3.64	n. d.	0.22	1.54	3.59	4.98							99.23	2.64
36 D4. V	74.64	14.00	1.05	n. d.	0.37	1.76	7.77		0.41						100.00	
37 B4. V	69.45	15.93	1.31	n. d.	0.55	1.91	4.33	5.16	0.50						99.14	
38 B4. V	69.25	16.04	1.72	n. d.	0.31	1.89	4.52	4.94	0.43						99.10	2.670
39 D4. V	68.89	16.47	2.34	n. d.	0.40	1.63	4.38	4.15	0.32						98.58	
40 B4. V	68.81	17.67	1.13	n. d.	0.50	2.17	4.97	3.90	0.30						99.45	
41 B4. V	68.76	16.80	0.99	n. d.	1.00	2.72	3.70	4.82	0.29						99.08	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
22	Waterford, Connecticut.	Ricketts and Banks.	W. C. Day, U. S. G. S. A. R. 19, VI, p. 214, 1898.	Granite.	In W. T., p. 373.
23	New York City, New York.	V. Ziegler.	V. Ziegler, Ann. N. Y. Ac. Sci., XXI, p. 5, 1911.	Granite.	
24	Cornell Dam, near Peekskill, New York.	E. Walker.	G. S. Rogers, Ann. N. Y. Ac. Sci., XXXI, p. 61, 1911.	Granite.	
25	Stony Point, Rockland County, New York.	J. F. Geiste.	W. C. Day, U. S. G. S. A. R. 20, VI, p. 421, 1899.	"Granite" (diorite).	In W. T., p. 373.
26	Wilmington, Delaware.	Booth, Garrett, and Blair.	W. C. Day, U. S. G. S. A. R. 19, VI, p. 214, 1898.	"Granite" (quartz diorite).	In W. T., p. 373.
27	Petersburg, Virginia.	Hunt and Clapp.	W. C. Day, U. S. G. S. A. R. 19, VI, p. 227, 1898.	Granite	In W. T., p. 375.
28	Bellemont, Gaston County, North Carolina.	Not stated.	J. A. Holmes, N. C. G. S. Rep., I, p. 84, 1893.	Granite.	Not in W. T.
29	Dunns Mountain, Rowan County, North Carolina.	Not stated.	J. A. Holmes, N. C. G. S. Rep., I, p. 89, 1893.	Granite.	Not in W. T.
30	Mount Airy, Surry County, North Carolina.	Not stated.	J. A. Holmes, N. C. G. S. Rep., I, p. 94, 1893.	Granite.	Not in W. T.
31	Morrisville, Iredell County, North Carolina.	Not stated.	J. A. Holmes, N. C. G. S. Rep., I, p. 87, 1893.	Granite.	Not in W. T.
32	Rion quarry, Fairfield County, South Carolina.	Not stated.	E. Sloan, S. C. G. S. (IV), B. 2, p. 214, 1908.	Granite.	
33	Heath Springs, Kershaw County, South Carolina.	Hardin and Robertson.	E. Sloan, S. C. G. S. (IV), B. 2, p. 219, 1908.	Granite.	
34	Pacolet River, Spartanburg County, South Carolina.	Pittsburgh Testing Laboratory.	E. Sloan, S. C. G. S. (IV), B. 2, p. 198, 1908.	Granite.	
35	Anderson quarry, Fairfield County, South Carolina.	Garrett, Booth, and Blair.	E. Sloan, S. C. G. S. (IV), B. 2, p. 210, 1908.	Granite.	
36	Washington, Wilkes County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 225, 1902.	Granite.	Alkalies by difference.
37	Elberton, Elbert County, Georgia.	T. L. Watson.	T. L. Watson, Am. G., XXVII, p. 204, 1901.	Granite.	
38	Elberton, Elbert County, Georgia.	T. L. Watson.	T. L. Watson, Am. G., XXVII, p. 204, 1901.	Granite.	
39	Loganville, Walton County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 150, 1902.	Granite gneiss.	
40	Near Lexington, Coweta County, Georgia.	T. L. Watson.	T. L. Watson, A. G., XXVII, p. 204, 1901.	Granite.	Also in Ga. G. S. B. 9 A, p. 88, 1902.
41	Camak, Warren County, Georgia.	T. L. Watson.	T. L. Watson, Am. G., XXVII, p. 214, 1901.	Granite.	

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
42	63.27	19.93	2.82	n. d.	0.49	2.89	4.14	4.85	0.86						99.25	2.739
B4. V																
43	61.18	22.80	1.74	n. d.	0.34	3.06	(7.94)		2.94						100.00	
D4. V																
44	53.58	26.27	3.07	n. d.	1.44	0.17	1.88	3.85	9.02						99.28	
D4. V																
45	43.35	28.03	4.75	n. d.	3.45	3.97	(5.35)		6.10						100.00	
D4. V																
46	76.62	13.02	1.01	n. d.	0.05	0.51	2.24	6.38							99.83	
C4. V																
47	73.78	17.18	n. d.	1.64	n. d.	0.85	2.82	4.48	0.12						100.87	
B4. V																
48	67.99	15.85	5.36	n. d.	0.41	1.78	3.21	4.81	0.30						99.71	
B4. V																
49	66.10	20.82	1.52	2.17	0.95	1.57	2.94	3.48	0.54						100.09	
B3. IV																
50	77.05	11.77	2.33	n. d.	n. d.	2.21	2.90	3.98	0.52			0.02			100.68	
B4. V																
51	71.43	16.80	1.22	0.16	1.42	0.99	3.42	3.48	0.85			0.35	0.22		99.34	
C2. 4																
52	71.98	15.07	2.69	n. d.	0.58	2.46	(6.92)		0.20						100.00	
D4. V																
53	71.74	14.54	1.46	1.80	0.39	3.13	(6.06)		0.92						100.00	
D4. V																
54	67.45	13.04	8.34	n. d.	2.65	4.68	(3.57)		0.27						100.00	
D4. V																
55	68.24	16.30	3.50	n. d.	1.88	3.20	(6.40)		0.48						100.00	
D4. V																
55	75.35	13.69	3.94	n. d.	0.06	2.97	1.14	2.85	n. d.						100.00	
C4. V																
56	71.63	13.86	0.46	2.76	trace	3.26	3.40	2.65	0.89		trace	0.20			99.11	2.68
B3. IV																
57	71.60	13.63	3.03	n. d.	0.94	3.37	4.54	1.31	0.63						99.04	
C4. V																
58	69.33	12.77	2.19	n. d.	1.03	7.23	4.75	0.42	1.47						99.19	
C4. v																
59	64.91	21.49	1.09	4.62	1.13	0.71	2.72	3.55	n. d.						100.22	
C3. v																

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
42	Greenville, Meriwether County, Georgia.	T. L. Watson.	T. L. Watson, Am. G., XXVII, p. 216, 1901.	Granite.	
43	Newnan, Coweta County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 87, 1902.	Granite.	Weathered. Alkalies by difference.
44	Coweta station, Coweta County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 93, 1902.	Granite.	Weathered. Cf. No. 4, 1.5.2.3.
45	Greenville, Meriwether County, Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 75, 1902.	Granite.	Alkalies by difference. Weathered surface. Cf. No. 42, above.
46	Waushara County, Wisconsin.	Not stated.	W. C. Day, U. S. G. S. A. R. 18 (V), p. 975, 1897.	Granite.	In W. T., p. 375.
47	Montello, Fox River valley, Wisconsin.	W. W. Daniells.	Hobbs and Leith, B. Un. Wisc. 158, p. 262, 1907.	Granite.	
48	Wausau, Wisconsin.	W. W. Daniells.	S. Weidman, J. G., XII, p. 552, 1904.	Granite.	
49	Athelstane, Wisconsin.	W. W. Daniells.	E. R. Buckley, Wisc. G. S. B. IV, p. 148, 1898.	Granite.	In W. T., p. 161
50	Graniteville, Missouri.	W. H. Melville.	C. R. Keyes, Mo. G. S. Rep., sh. 4, p. 25, 1895.	Granite.	In W. T., p. 375.
51	Sugarloaf Mountain, Boulder County, Colorado.	C. D. Henry.	C. D. Henry, Pr. Col. Sc. Soc., VII, p. 116, 1903.	Granite.	3 places.
52	Little Spokane River, Washington.	R. W. Thatcher.	S. Shedd, Wash. G. S. A. R. II, p. 43, 1902.	Granite.	Alkalies by difference.
53	Wawawai Canyon, Snake River, Washington.	R. W. Thatcher.	S. Shedd, Wash. G. S. A. R. II, p. 37, 1902.	Granite.	Alkalies by difference.
54	Index, Washington.	R. W. Thatcher.	S. Shedd, Wash. G. S. A. R. II, p. 39, 1902.	Granite.	Alkalies by difference.
55	Medical Lake, Washington.	R. W. Thatcher.	S. Shedd, Wash. G. S. A. R. II, p. 46, 1902.	Granite.	Alkalies by difference.
55	Exeter, Tulare County, California.	Watertown Arsenal.	W. C. Day, U. S. G. S. A. R. 20, VI, p. 358, 1899.	Granite.	In W. T., p. 375.
56	Carmelo Bay, California.	J. Posada.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 16, 1893.	Granite.	In W. T., p. 189.
57	George's Dog, Virgin Gorda, West Indies.	P. T. Cleve.	P. T. Cleve, Sv. Vet. Ak. Hndl., IX, No. 12, p. 33, 1871.	Granite.	Not in W. T.
58	Sound, Virgin Gorda, West Indies.	T. Nordström.	P. T. Cleve, Sv. Vet. Ak. Hndl., IX, No. 12, p. 34, 1871.	Granite.	Not in W. T.
59	Janucillo, Monte Cumbre, Argentina.	J. C. Jenkins.	A. Stelzner, Btr. G. Arg., I, p. 211, 1885.	Anden granite.	Al ₂ O ₃ high. In W. T., p. 375.

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
60 C1. V	75.8	13.7	0.5	0.3	trace	0.5	1.9	6.5	0.3						99.5	2.59
61 C1. V	66.6	17.4	1.1	2.1	1.2	2.2	3.1	4.6	0.9						99.2	2.62
62 C3. V	62.3	18.6	1.5	3.0	2.5	4.3	1.9	4.8	0.6						99.5	2.67
63 B3. IV	67.12	20.12	3.71	0.28	0.82	1.79	1.53	3.38	1.01				CO ₂ SO ₃	0.03 0.05	99.84	2.701
64 B3. IV	66.02	21.43	4.62	0.63	1.77	1.81	0.15	3.17	0.16				CO ₂ SO ₃	0.08 0.04	99.88	2.731
65 C2. IV	59.34	18.91	6.22	0.95	2.55	3.97	2.61	2.91	1.43		0.72	0.26	Cl	0.03	99.90	
66 B4. V	68.55	16.21	2.26	n. d.	1.04	2.40	4.08	4.14	n. d.				0.45		99.13	
67 C4. V	70.6	13.3	3.1	n. d.	0.4	2.2	0.8	9.2	0.3						99.9	
68 B1. V	74.69	16.21	trace	1.16	0.48	0.28	1.18	3.64	1.23				0.58	Li ₂ O 0.10	99.55	2.64
69 D4. V	72.43	18.08	2.20	n. d.	trace	trace	4.12		3.69	0.29			trace		100.81	2.45
70 B4. V	75.00	13.24	2.52	n. d.	n. d.	0.69	3.07	4.33	0.80						99.65	
71 D4. V	71.78	15.86	4.19	n. d.	0.50	3.16	4.10	1.13	1.17						101.89	
72 B4. V	70.69	15.20	3.76	n. d.	0.45	3.31	4.69	2.31	0.56						101.07	
73 B3. IV	72.5	16.3	2.5	n. d.	0.5	1.1	3.2	3.2	0.54		0.2	trace	Cl	trace	100.04	
74 A4. IV	75.12	13.21	2.66	n. d.	trace	0.33	4.46	3.55	0.47						99.80	
75 C4. V	71.80	16.00	1.76	n. d.	1.83	1.74	3.47	4.20	0.62						101.42	
76 C4. V	70.10	16.56	n. d.	1.66	0.61	1.85	5.58	3.69	0.97				trace		101.58	
77 D4. V	69.8	15.6	3.0	n. d.	1.2	1.5	4.0	4.7							99.8	
78 D4. V	77.4	13.8	1.4	n. d.	0.5	0.3	6.5	0.5	0.7						101.1	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
60	Ben Dambain, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Eurite.	In W. T., p. 375.
61	Alt-na-Lairige, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Granitite.	In W. T., p. 375.
62	Alt-na-Lairige, Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Granitite.	In W. T., p. 375.
63	Staindrop Rig, Cheviot Hills, Scotland.	I. Macadam.	H. Kynaston, Tr. G. Soc. Edin., VII, p. 394, 1899.	Granite.	Al ₂ O ₃ high. Alkalies low. In W. T., p. 135.
64	Black Lynn, Linhope, Cheviot Hills, Scotland.	I. Macadam.	H. Kynaston, Tr. G. Soc. Edin., VII, p. 394, 1899.	Granite.	Al ₂ O ₃ high. Alkalies low. In W. T., p. 215.
65	Stratherrie, Glen Liath, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc. Edin., VIII (1), p. 54, 1901.	Granite.	
66	Shap Fell, Westmoreland, England.	J. B. Cohen.	Harker and Marr, Q. J. G. S., XLVII, p. 276, 1891.	Granite.	In W. T., p. 375.
67	Y Drosge, Caernarvonshire, Wales.	E. H. Acton.	A. Harker, Bala. Volc. Ser., p. 46, 1889.	Granophyre.	Alkalies? In W. T., p. 375.
68	Carn Brea Hill, Redruth, Cornwall.	Phillips.	J. J. H. Teall, Brit. Petrog., p. 314, 1888.	Granite.	Al ₂ O ₃ high. Alkalies low. MnO high. In W. T., p. 125.
69	Trelavour Downs, Bodmin, Cornwall.	Collins.	W. A. E. Usscher, G. S. Eng. Mem. Sh. 347, p. 73, 1909.	Elvan.	
70	Mourne Mountains, Ireland.	S. Houghton.	W. J. Sollas, Tr. R. Ir. Ac., XXX, (XI), p. 491, 1894.	Granite.	In W. T., p. 375.
71	Aughrim, Leinster, Ireland.	Not stated.	W. J. Sollas, Tr. R. Ir. Soc., XXIX (XIV), p. 477, 1891.	Microgranite.	In W. T., p. 375.
72	Aughrim, Leinster, Ireland.	Not stated.	W. J. Sollas, Tr. R. Ir. Soc., XXIX (XIV), p. 471, 1891.	Soda granite.	In W. T., p. 375.
73	Foxdale, Isle of Man.	W. C. Simmons.	W. C. Simmons, G. Mag. (V), VIII, p. 351, 1911.	Granite.	
74	Guisanne River, Pelvoux, Dauphiny, France.	Rüst.	P. Termier, B. Soc. G. Fr., XXVII, p. 404, 1899.	Granite.	Not in W. T.
75	Le Huelgoat, Brittany, France.	Not stated.	C. Barrois, Cong. G. Int., VIII, Guide 7, p. 21, 1900.	Granite.	In W. T., p. 375.
76	Cevius, Isere Valley, France.	E. Ritter.	E. Ritter, B. Sv. Ct. G. Fr., IX, No. 60, p. 30, 1897.	Protagine.	Not in W. T.
77	Actot, Flamanville, La Marche, France.	Not stated.	A. Leclere, B. Sv. Ct. G. Fr., XVII, No. 113, p. 7, 1906.	Granite.	Other analyses in paper.
78	Dames de Meuse, Ardennes, France.	J. de Lapparent.	J. de Lapparent, B. Soc. M. Fr., XXXII, p. 257, 1909.	Microgranite.	Alkalies?

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
79 D4. V	74.7	13.3	2.9	n. d.	2.3	0.4	4.6	2.1	1.0						101.3	
80 D4. V	70.8	15.0	4.1	n. d.	1.0	2.2	5.1	2.3	0.8						101.3	
81 B4. V	76.62	11.76	n. d.	3.51	0.22	1.80	3.02	2.85	0.70						100.48	
82 B4. V	76.20	12.89	n. d.	1.72	0.80	0.50	3.19	3.93	1.16						100.39	
83 B4. V	75.96	13.38	n. d.	1.66	0.34	0.88	3.32	4.58	0.46						100.58	
84 C4. V	74.66	13.84	n. d.	2.01	0.41	1.05	3.33	5.34	0.64						101.28	
85 B4. V	74.14	13.30	n. d.	1.61	0.20	0.69	3.63	6.08	0.60						100.25	
86 B4. V	72.42	14.83	n. d.	1.79	0.28	1.15	3.42	5.49	0.53						99.91	
87 C4. V	72.15	16.12	n. d.	2.01	0.32	1.20	3.43	5.71	0.74						101.68	
88 B4. V	72.08	13.54	n. d.	2.75	0.40	1.15	4.33	4.76	0.51						99.52	
89 B4. V	71.84	14.07	n. d.	2.01	0.40	1.08	4.11	5.25	0.86						99.62	
90 B4. IV	70.62	15.50	n. d.	2.84	0.32	2.05	3.05	4.76	1.01						100.15	
91 B4. IV	69.95	14.35	n. d.	3.47	1.20	1.27	3.32	4.92	1.29						99.77	
92 B4. IV	69.85	16.10	n. d.	1.89	0.71	0.72	3.21	6.13	0.90						99.51	
93 B4. IV	69.54	15.20	n. d.	2.76	0.34	2.16	4.19	5.37	0.97						100.53	
94 D4. V	68.55	15.95	n. d.	1.85	0.46	1.86	3.70	5.57	0.91						98.85	
95 B4. V	68.91	15.89	n. d.	3.46	0.60	2.35	4.10	4.01	0.53						99.85	
96 B5. V	68.53		20.37		0.45	2.47	3.17	5.25	0.39						100.63	
97 D4. V	66.35	17.47	n. d.	3.18	0.46	2.31	5.64	5.43	0.73						101.57	
98 B4. V	62.10	18.02	n. d.	3.57	0.75	2.59	6.51	4.07	1.99					G10 1.02	100.62	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
79	Dames de Meuse, Ardennes, France.	J. de Lapparent.	J. de Lapparent, B. Soc. M. Fr., XXXII, p. 257, 1909.	Microgranite.	
80	Mairus, Ardennes, France.	J. de Lapparent.	J. de Lapparent, B. Soc. M. Fr., XXXII, p. 257, 1909.	Microgranite.	
81	Aiguille du Grand Charmoz, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48, 1898.	Protogine.	Whole series unreliable. In W. T., p. 377.
82	Near Orny, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 377.
83	Arete du Chatelet, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 47.	Protogine.	In W. T., p. 377.
84	Treutz Bouc, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
85	Arete de la Breya, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 47.	Protogine.	In W. T., p. 379.
86	Col du Geant, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
87	Pas d'Arpette, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
88	Le Pissoir, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
89	Clocher de Planereuse, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 47.	Protogine.	In W. T., p. 379.
90	Aiguille du Dru, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
91	Col du Chardonnet, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
92	Glacier d'Orny, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
93	Glacier d'Orny, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
94	Glacier d'Orny, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
95	Glacier de Brensa, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
96	Le Portalet, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 47.	Protogine.	In W. T., p. 379.
97	Rocher de la Tourette, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine.	In W. T., p. 379.
98	Aiguille de Charmoz, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 48.	Protogine with beryl.	In W. T., p. 203.

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
99 D3. III	61.27	16.35	3.02	6.00	1.69	4.57	1.94	7.26	0.45				0.48		102.03	
100 C4. V	76.5	13.9	0.5	0.7	0.1	0.5	3.7	4.5	0.8						101.2	
101 B4. V	61.90	19.45	5.25	n. d.	1.80	3.85	4.30	1.60	1.40						99.55	
102 C4. V	59.60	22.25	3.95	n. d.	2.05	0.60	7.40	1.15	3.50						99.50	
103 D4. V	79.40	9.28	1.00	n. d.	1.76	0.28	3.83	1.44	1.10						98.09	
104 B3. IV	76.22	12.45	0.88	0.10	0.54	2.57	3.40	2.86	0.10						99.12	
105 C3. V	76.19	12.30	0.83	0.20	0.53	0.36	5.60	2.14	0.60						98.75	
106 B3. IV	75.64	10.43	2.45	0.08	1.50	0.39	2.67	4.70	1.20						99.06	
107 B4. V	74.74	11.97	1.88	0.64	n. d.	n. d.	4.25	5.61							99.09	
108 B3. IV	73.79	12.36	0.63	0.52	0.19	trace	5.45	5.71	0.51						99.16	2.573
109 B4. V	71.79	14.26	1.61	0.72	n. d.	n. d.	6.61	4.10							99.09	
110 B4. V	70.56	11.88	6.52	trace	trace	trace	7.04	3.70							99.70	
111 D3. V	67.63	16.90	2.37	0.32	1.61	1.95	5.31	3.34	2.10			0.30			101.83	
112 C4. V	66.62	17.35	3.91	0.19	trace	trace	4.52	4.93	1.85			0.99			100.36	
113 C3. V	73.01	13.80	2.75	n. d.	1.04	2.03	3.37	4.97	0.38		0.29				101.64	
114 C2. IV	68.69	17.12	0.88	0.41	0.39	1.91	7.03	3.82	0.56		0.31			F BaO	trace 0.40	101.52
115 B4. V	73.82	14.44				0.35	2.45	8.90	n. d.						99.96	
116 B4. V	73.70	14.11	n. d.	n. d.	n. d.	0.39	3.04	8.72	n. d.						99.96	
117 B4. V	74.04	14.44	n. d.	n. d.	n. d.	0.33	2.01	9.36	n. d.						100.18	
118 D4. V	76.8	14.9	n. d.	n. d.	n. d.	1.7	6.1	1.5	n. d.						101.0	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
99	Mont Blanc.	E. Ritter.	E. Ritter, B. Sv. Ct. G. Fr., IX, No. 60, p. 32, 1897.	Inclusion in protogine.	Not in W. T.
100	Pic du Midi d'Ossan, Pyrenees.	Not stated.	J. de Lapparent, B. Soc. M. Fr., XXXIV, p. 297, 1911.	Microgranite.	
101	Trois Seigneurs, Pyrenees.	M. Longchambon.	M. Longchambon, B. Sv. Ct. G. Fr., XXI, No. 131, p. 41, 1912.	Granite.	Al ₂ O ₃ high.
102	Freychinede, Pyrenees.	M. Longchambon.	M. Longchambon, B. Sv. Ct. G. Fr., XXI, No. 131, p. 41, 1912.	Granite gneiss.	Al ₂ O ₃ high. Alkalies?
103	Giravalle, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 61, 1907.	Micropegmatite.	
104	Calanques de Piana, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 35, 1906.	Granite.	
105	Locality not stated. Northwest Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 60, 1907.	Microgranite.	
106	Canava landre Vico, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 58, 1907.	Elvan granite.	
107	Salto, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 37, 1906.	Granite.	
108	Ahietto, Corsica.	G. Rupprecht.	G. Rupprecht, In. Diss. Erl., p. 14, 1889.	Granite.	In W. T., p. 377.
109	Capoalla Cuculla, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 39, 1906.	Micropegmatite.	
110	Capreja, Taïta Valley, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 53, 1907.	Microgranite.	
111	Locality not stated. Northwest Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 56, 1907.	Microgranite.	
112	Ajaccio, Corsica.	G. Rupprecht.	G. Rupprecht, In. Diss. Erl., p. 6, 1889.	Biotite granite.	In W. T., p. 377.
113	Articuza, La Haya, Guipuzcoa, Spain.	Pisani.	P. Terrier, B. Soc. G. Fr. (4), VI, p. 13, 1907.	Granite.	
114	Prestern Saeter, near Brudvik, Bergen, Norway.	P. Schei.	C. F. Kolderup, Berg. Mus. Aarb., 1903, No. 12, p. 118.	Granite.	
115	Hi Herø, Norway.	Students.	J. H. L. Vogt, Sil. Schm. Lös., II, p. 120, 1904.	Graphic granite.	
116	Arendal, Norway.	E. A. Dalset.	J. H. L. Vogt, Sil. Schm. Lös., II, p. 120, 1904.	Graphic granite.	
117	Voie, Arendal, Norway.	A. Gröningsaefer.	J. H. L. Vogt, Sil. Schm. Lös., II, p. 120, 1904.	Graphic granite.	
118	Evje, Sætersdohn, Norway.	Student.	J. H. L. Vogt, Sil. Schm. Lös., II, p. 120, 1904.	Graphic granite.	Alkalies? "Analysis not reliable." Cf. Ref.

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
119 C4. V	74.47	15.13	n. d.	n. d.	n. d.	0.72	2.01	7.06	n. d.						99.39	
120 B4. V	74.00	14.31	n. d.	n. d.	n. d.	0.39	2.42	9.02	n. d.						100.14	
121 C3. V	71.77	12.17	0.71	2.53	0.43	1.34	5.27	2.92	1.09						98.23	
122 C3. V	71.23	8.68	4.73	3.42	0.74	1.25	3.70	4.69	1.70						100.14	
123 B3. IV	71.25	16.09	0.32	1.56	0.28	0.66	0.81	7.96	n. d.				0.18		99.11	
124 B4. V	75.59	12.93	n. d.	n. d.	n. d.	trace	3.44	7.05	0.69						99.70	
125 B3. IV	70.96	16.24	1.11	1.57	0.30	0.65	1.53	5.28	1.41				0.07		99.12	
126 B3. IV	70.79	15.96	1.84	1.42	0.46	0.82	1.09	6.77	n. d.				0.11		99.26	
127 C3. V	70.75	14.03	0.42	2.94	0.53	1.66	3.51	3.87	0.96						98.67	
128 B4. V	70.67	14.80	n. d.	3.07	trace	1.33	2.51	8.26	n. d.						100.67	
129 B3. V	69.31	14.80	0.82	2.81	0.46	1.24	1.84	7.25	0.47						99.00	
130 B3. IV	68.04	17.29	1.68	2.58	0.67	1.67	1.20	6.42	1.16				0.07		100.78	
131 C3. V	67.3	15.2	1.2	3.4	1.2	3.6	3.8	3.4	1.7				0.4		101.2	
132 D4. V	76.15	8.29	5.04	2.40	0.07	0.52	6.50	trace	0.03			trace	trace		100.15	
133 D4. V	75.67	11.53	1.53	n. d.	0.20	2.79	3.67	1.82	0.32						97.52	
134 B4. V	72.92	13.07	2.73	n. d.	0.23	5.83	3.20	0.51	0.61						99.10	
135 C4. V	61.64	19.69	3.68	n. d.	0.53	6.43	4.88	0.75	0.55						98.15	
136 D4. V	70.46	11.16	4.92	n. d.	1.23	2.34	2.88	4.31	0.62						97.92	
137 C4. V	64.83	13.82	6.82	n. d.	0.31	4.40	4.90	4.60	0.53						100.21	
138 C3. V	66.58	16.20	0.71	0.63	0.12	1.22	5.21	7.94	0.72						99.36	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
119	Raade, Smaalene, Norway.	L. Andersen-Aars.	J. H. L. Vogt, Sil. Schm. Lös., II, p. 120, 1904.	Graphic granite.	
120	Ili Herø, Norway.	Students.	J. H. L. Vogt, Sil. Schm. Lös., II, p. 120, 1904.	Graphic granite.	
121	Bejby, Örebro, Sweden.	A. Hasselbom.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
122	Ullesäter, Örebro, Sweden.	A. Hasselbom.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	Al ₂ O ₃ high or alkalies low. Cf. ref.
123	Eusta, Rydboholm, Sweden.	E. Erdman.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
124	Silfickarehalet, Kullen, Sweden.	L. G. Thomé.	A. Hennig, Lund. Un. A. sk., XXXV (2), No. 5, p. 28, 1899.	Pegmatite.	In W. T., p. 377.
125	Kattnäs, Hörningsholm, Sweden.	M. Stolpe.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	Al ₂ O ₃ high or alkalies low.
126	Rackstad, Rydboholm, Upland, Sweden.	E. Erdman.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	
127	Bergaby, Linde, Sweden.	D. Hummel.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Pegmatitic granite.	
128	Vasastaden, Sweden.	H. Bäckström.	H. Bäckström, G. F. F., IX, p. 357, 1887.	Orbicular granite.	In W. T., p. 377.
129	Villeboda, Linde, Sweden.	A. Hasselbom.	P. J. Holmquist, B. Un. Ups., VII, p. 260, 1906.	Granite.	
130	Hälltorp, Vardinge, Hörningsholm, Sweden.	M. Stolpe.	P. J. Holmquist, B. Un. Ups., VII, p. 258, 1906.	Granite.	Al ₂ O ₃ high or alkalies low.
131	Upsala, Sweden.	A. G. Högbom.	A. G. Högbom, G. F. F., X, p. 222, 1888.	Granite.	In W. T., p. 377.
132	Kivikulma, Pitkäranta, Finland.	A. Pettersen.	V. Hackman, B. C. G. Fin., No. 15, p. 26, 1905.	Rapakivi granite.	Alkalies bad. Cf. ref.
133	Kangasniemi, Finland.	T. Hirn.	B. Frosterus, B. C. G. Fin., No. 4, p. 22, 1896.	Orbicular granite.	Outer zone. Not in W. T.
134	Kangasniemi, Finland.	II. Berghell.	B. Frosterus, B. C. G. Fin., No. 4, p. 22, 1896.	Orbicular granite.	Inner zone. Not in W. T.
135	Kangasniemi, Finland.	II. Berghell.	B. Frosterus, B. C. G. Fin., No. 4, p. 22, 1896.	Orbicular granite.	Andesine zone. Not in W. T.
136	Kangasniemi, Finland.	II. Berghell.	B. Frosterus, B. C. G. Fin., No. 4, p. 22, 1896.	Kugel granite.	Main rock. Not in W. T.
137	Kangasniemi, Finland.	Bergroth and Cedercrenz.	B. Frosterus, B. C. G. Fin., No. 4, p. 22, 1896.	Kugel granite.	Center of kugel. Not in W. T.
138	Franziska Mine, Pitkäranta, Finland.	II. Berghell.	V. Hackman, B. C. G. Fin., No. 15, p. 47, 1905.	Granite gneiss.	

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
139 D2. V	74.20	12.16	1.04	0.16	0.31	0.80	6.33	2.48	0.58		0.13	0.09	trace		98.27	
140 B4. V	71.62	12.83	0.13	0.10	n. d.	1.48	3.81	9.69	0.02						99.68	
141 C3. V	71.53	13.70	1.79	2.34	0.48	2.08	6.71	2.82	0.34						101.79	
142 D3. V	66.95	15.03	2.14	3.23	0.33	3.22	4.43	2.46	0.39						98.18	
143 C2. IV	70.40	15.21	0.18	1.22	0.59	1.33	2.79	6.27	0.78		0.16	0.05	trace		98.98	
144 C3. V	69.52	14.04	0.34	4.42	0.32	2.40	3.40	6.25	0.52						101.21	
145 A4. IV	73.13	14.35			0.19	1.03	3.23	7.13	0.68			trace			99.74	2.579
146 B4. V	67.70	16.08	5.26	n. d.	0.95	1.65	3.22	5.78	n. d.		0.50				101.14	
147 B3. IV	77.27	9.98	2.58	0.41	0.51	2.28	2.14	2.39	0.86		trace	trace	0.99	CO ₂ trace	99.41	2.667
148 B4. V	76.86	10.76	1.97	n. d.	0.81	1.42	2.46	4.33	1.04		trace	trace	0.36	BaO trace	100.01	2.655
149 A4. IV	76.10	14.36	2.99	trace	1.51	trace	3.77	0.81	0.11				0.48		100.13	2.469
150 C3. V	74.19	12.80	2.11	1.17	0.50	0.02	2.49	4.48	0.30	0.04	0.06	0.65			98.81 (99.82)	
151 B3. IV	53.75	12.63	9.06	4.44	4.57	5.27	3.37	1.93	4.00						99.02	2.748
152 B3. IV	75.25	13.36	0.28	1.23	0.02	0.65	2.91	4.55	0.64			0.18		Li ₂ O trace	99.07	2.669
153 C2. IV	74.22	11.16	1.69	2.03	0.61	1.23	3.84	3.04	0.68		0.02	0.16			98.68	
154 C3. V	74.02	13.91	1.98	0.89	0.54	1.08	4.58	4.33	0.24			0.11			101.67	
155 C3. V	73.63	10.60	5.35	1.92	0.45	1.50	2.72	4.59	0.42			0.13			101.31	
156 B3. IV	71.93	15.54	0.59	2.10	0.46	1.60	2.61	5.30	0.69		trace	0.27		Cu Li ₂ O trace trace	101.09	2.664
157 C3. V	71.58	14.39	1.40	1.27	0.93	2.01	3.31	4.82	1.18			0.31		Li ₂ O Cu trace trace	101.20	2.668
158 B3. IV	70.92	9.37	11.74	0.08	trace	0.77	1.47	3.98	0.68		0.54		0.01	FeS ₂ 0.05	99.61	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
139	Walkea järvenvaara, Tornea, Finland.	G. Aminoff.	V. Hackman, B. C. G. Fin., No. 15, p. 29, 1905.	Granite.	
140	Söderö, Wänö, Finland.	H. Berghell.	H. Berghell, Fin. G. Und., Bl. 23, p. 18, 1892.	Granite.	In W. T., p. 145.
141	Wi'org, Finland.	H. Berghell.	H. Berghell, Fin. G. Und., Bl. 33, p. 23, 1898.	Rapakivi granite.	In W. T., p. 377.
142	Simola, Wi'org, Finland.	H. Berghell.	H. Berghell, Fin. G. Und., Bl. 33, p. 25, 1898.	Rapakivi granite.	In W. T., p. 377.
143	Aavasaksa, Tornea, Finland.	G. Aminoff.	V. Hackman, B. C. G. Fin., No. 15, p. 39, 1905.	Granite.	
144	Huovila, Säkkijärvi, Finland.	H. Berghell.	H. Berghell, Fin. G. Und., Bl. 28, p. 15, 1896.	Rapakivi granite.	In W. T., p. 377.
145	Michelsberg, Katzenbuckel, Odenwald.	W. Freudenberg.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 339, 1907.	Granite.	Inclusion in shonkinite.
146	Durbach, Schwarzwald.	Not stated.	A. Sauer, Mt. Bad. G. L.-A., II, p. 243, 1890.	Granite.	Not in W. T. Cf. No. 1, II. 5.2.2.
147	Wengenwiese, near Heuweg, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kt. Hes. I, Bl. Rossdorf, p. 35, 1886.	Granite.	MnO high. In W. T., p. 139.
148	Dilshofen, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kt. Hes., I, Bl. Rossdorf, p. 36, 1886.	Microgranite.	In W. T., p. 377.
149	Dachsberg, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kt. Hes., I, Bl. Rossdorf, p. 35, 1886.	Granite.	In W. T., p. 377.
150	Gottelsberg, Aschaffenburg, Hesse.	Survey laboratory.	G. Klemm, Erl. G. Kt. Hes., Bl. Schafheim, p. 15, 1894.	Granite.	CaO and P ₂ O ₅ . In W. T., p. 377.
151	Suhl, Thuringia.	J. Fromme.	J. Fromme, Sb. Ph. Med. Ges. Erl., XXV, p. 31, 1893.	Granite.	Weathered. Not in W. T.
152	Schneeberg, Fichtelgebirge.	A. Böttger.	F. Sandberger, Sb. Bay. Ak. W., XVIII, p. 469, 1888.	Granite.	In W. T., p. 129.
153	Valetsberg, Wunsiedel, Fichtelgebirge.	H. Oberembt.	H. Oberembt, In. Diss. Erl., p. 38, 1905.	Granite gneiss.	
154	Manzelberg, Wunsiedel, Fichtelgebirge.	H. Oberembt.	H. Oberembt, In. Diss. Erl., p. 38, 1905.	Granite gneiss.	
155	Manzelberg, Wunsiedel, Fichtelgebirge.	H. Oberembt.	H. Oberembt, In. Diss. Erl., p. 19, 1905.	Granite.	
156	Zwisenberg, Fichtelgebirge.	A. Böttger.	F. v. Sandberger, Sb. Bay. Ak. W., XVIII, p. 466, 1888.	Granite.	In W. T., p. 169.
157	Reuth, near Gefrees, Bavaria.	A. Böttger.	F. Sandberger, Sb. Bay. Ak. W., XVIII, p. 466, 1888.	Granite.	In W. T., p. 377.
158	Eben, near Schwarzach, Bayrischer Wald.	Not stated.	K. v. Gümbel, G. v. Bayern, II, p. 436, 1894.	Granite.	Not in W. T.

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
159 B3. IV	69.05	11.09	11.30	0.31	trace	1.12	1.30	4.95	0.33		0.33		trace	S trace	99.78	
160 B4. V	74.68	12.73	n. d.	3.00	0.35	0.09	1.47	4.64	1.17						99.50	
161 B3. IV	71.57	12.40	n. d.	7.22	0.05	1.55	1.60	2.80	1.30		0.52			SnO ₂ 0.69 CuO 0.27	99.97	
162 C3. V	68.90	16.80	1.77	1.64	1.34	1.80	3.90	3.11	1.91			0.24			101.41	2.681
163 C3. V	74.62	13.87	0.77	1.55	0.09	0.72	3.24	5.41	0.80			0.17		S trace	101.24	
164 B4. V	70.6	17.3	2.5	n. d.	0.5	4.1	3.2	1.6	0.5						100.3	
165 B4. V	65.17	18.65	1.53	n. d.	trace	1.24	7.29	5.03	0.09			trace		CO ₂ 0.86	99.86	
166 B4. V	61.86	22.58	5.96	n. d.	1.72	0.99	2.13	4.02	1.60						100.86	
167 B3. IV	75.40	13.30	1.35	2.09	0.20	1.34	4.29	2.50	0.36			0.18	trace	S 0.02	101.03	
168 B3. IV	75.27	12.92	1.89	n. d.	0.47	0.32	1.14	6.48	0.61		trace		0.29	B ₂ O ₃ 1.24	100.63	2.66
169 B4. V	74.29	15.95			0.66	0.78	2.66	5.31	0.66			trace	trace		100.31	2.68
170 B4. V	72.02	16.78	2.92	n. d.	0.57	1.79	3.40	2.08	1.52					BaO 0.02	101.10	
171 C4. V	50.17	27.89	3.50	4.74	0.83	0.52	2.66	5.79	3.35						99.45	
172 B4. V	69.26	14.13	4.38	n. d.	3.31	4.31	1.54	1.96	0.99						99.88	
173 B3. IV	62.20	19.50	3.56	2.88	1.55	4.36	3.35	2.37	1.04		trace	0.38	trace	S trace	101.19	
174 C3. V	69.24	17.46	1.12	3.10	0.99	2.86	2.74	2.97	0.56		trace	0.25	trace		101.29	
175 D3. V	67.22	11.99	5.70	1.39	0.11	4.22	5.37	2.34	1.93	1.05	0.29				101.91	2.66
176 B4. V	75.04	10.14	n. d.	2.24	1.17	1.72	4.08	5.50	0.40					CO ₂ 0.13	100.42	
177 D3. V	67.87	15.96	1.65	3.02	1.40	1.73	3.72	4.26	1.08	0.25				CO ₂ 0.55	102.09	2.687
178 D3. V	67.66	16.16	1.36	2.87	1.16	2.82	3.54	4.75	1.34	0.18				CO ₂ 0.56	102.20	2.651

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
159	Rattenberg, near Viechtach, Bayrischer Wald.	Not stated.	K. v. Gümbel, G. v. Bayern, II, p. 436, 1894.	Granite.	Not in W. T.
160	Altenberg, Saxony.	Rube.	K. Dalmer, Erl. G. Kt. Sachs., Bl. 119, p. 53, 1908.	Granite.	
161	Altenberg, Saxony.	Rube.	K. Dalmer, Erl. G. Kt. Sachs., Bl. 119, p. 58, 1908.	Greisen.	
162	Strehlenberg, near Rodwitz, Bavaria.	A. Böttger.	F. Sandberger, Sb. Bay. Ak. W., XVIII, p. 466, 1888.	Lithionite granite.	In W. T., p. 377. Cf. No. 65, I.3.1.3.
163	Viktorschoe, Harz.	V. Hagen.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXXII, p. 185, 1912.	Granite.	
164	Ober-Buschwald, Schmiedeberg, Riesengebirge.	Not stated.	L. Milch., Rosenb. Fests., p. 138, 1906.	Granite.	
165	Schmiedeberg, Riesengebirge.	Not stated.	E. Riman, N. J. Cb., 1909, p. 768.	Granite.	CO ₂ primary?
166	Klotzsche, Lausitz.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 27, 1902.	Granite.	Al ₂ O ₃ high.
167	Huch, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien, LIX, p. 136, 1909.	Granite gneiss.	
168	Rican, near Prague, Bohemia.	K. Preis.	F. Katzer, Jb. G. R.-A. Wien, XXXVIII, p. 411, 1888.	Tourmaline pegmatite.	In W. T., p. 125
169	Rican, near Prague, Bohemia.	E. Kubricht.	F. Katzer, Jb. G. R.-A. Wien, XXXVIII, p. 411, 1888.	Granite.	In W. T., p. 377.
170	Veitsberg, near Karlsbad, Bohemia.	A. Schwager.	K. v. Gümbel, Geog. Jbft., VII, p. 69, 1894.	Granite.	Not in W. T.
171	Lobendan, near Hainspach, Bohemia.	R. Reinisch.	R. Reinisch, Hab. Schr. Leip., p. 27, 1902.	Granite.	Altered and squeezed.
172	Reifnig, Bachergebirge, Styria.	A. Pontoni.	A. Pontoni, T. M. F. M., XIV, p. 366, 1895.	Granite.	In W. T., p. 377.
173	Blansko, Brünn, Moravia.	C. v. John.	v. John and Suess, Jb. G. R.-A. Wien, LVIII, p. 249, 1905.	Granitite.	
174	Brixen, Tyrol.	C. v. John.	W. Petraschek, Jb. G. R.-A. Wien, LIV, p. 51, 1905.	Granitite.	
175	Rensenspitz, near Maul, Tyrol.	G. Hradil.	G. Hradil, Sb. Ak. W. Wien, CXXI, p. 869, 1912.	Granite.	
176	Stockstige, Grimsel, Aarmassif, Switzerland.	Rosicky.	A. Baltzer, Btr. G. Kt. Schw., XXIV (4), p. 20, 1888.	Granite.	Not in W. T.
177	Alpetli Glacier, Aarmassif, Switzerland.	L. Duparc.	E. Fellenberg, Btr. G. Kt. Schw., XXI, p. 45, 1893.	Granite.	Not in W. T.
178	Gasteren, Aarmassif, Switzerland.	L. Duparc.	E. Fellenberg, Btr. G. Kt. Schw., XXI, p. 45, 1893.	Granophyre.	Not in W. T.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
179 B3. IV	63.8	17.9	2.8	1.1	0.6	3.4	1.4	2.2	0.8						100.00	
180 C3. V	66.3	16.9	5.4	1.4	1.9	2.6	2.7	0.4	1.5						99.10	
181 B3. IV	66.97	17.20	3.27	1.26	2.08	3.94	5.48	0.69	0.11						101.00	
182 B4. V	72.95	16.51	1.62	n. d.	0.43	3.27	1.04	3.12	0.98			0.23			100.15	2.623
183 C3. V	76.55	10.69	n. d.	0.73	1.18	1.71	4.20	5.34	0.46		0.06	0.12			101.04	2.60
184 D3. V	71.94	14.73	n. d.	1.43	1.01	1.39	5.38	4.68	0.79		0.14	0.10			101.59	2.67
185 C3. V	66.75	15.73	n. d.	2.58	1.67	2.15	5.22	4.90	1.70		0.48	0.07	trace		101.25	2.71
186 C4. V	72.45	16.19	0.55	n. d.	0.27	2.95	4.53	3.59	0.34	0.22		0.30			101.39	2.640
187 D4. V	70.21	15.72	5.03	n. d.	1.07	2.11	3.66	3.25	0.48			0.29	trace		101.82	
188 C4. V	69.92	15.68	4.57	n. d.	0.92	1.85	4.35	3.18	0.59			0.24	trace	ZrO ₂ trace	101.30	2.69
189 B4. V	69.30	16.40	n. d.	4.50	1.18	1.12	5.02	3.46	n. d.						100.98	
190 C4. V	66.91	20.31	0.54	n. d.	0.26	1.86	9.19	0.48	0.66		trace				100.21	2.66
191 B3. IV	71.01	11.86	3.92	2.31	0.26	1.24	2.59	3.02	0.93			0.85		CO ₂ 0.09 Cl 0.88 F 0.93	99.89	
192 B4. V	74.59	13.27	2.87	n. d.	2.07	1.21	2.69	3.21	0.04						99.95 (99.89)	
193 C4. V	71.21	13.91	4.18	n. d.	1.21	2.13	1.31	4.79	0.14						98.88	
194 B4. V	70.99	14.53	3.78	n. d.	1.03	2.31	1.37	5.48	0.35						99.84 (99.85)	
195 D4. V	68.73	13.57	3.75	n. d.	1.78	3.14	2.25	4.73	0.06						98.52	
196 B4. V	72.60	15.48	1.52	n. d.	1.50	1.71	3.46	3.32	0.92						100.51 (99.51)	
197 D4. V	71.24	17.04	n. d.	n. d.	trace	2.87	4.54	1.76	1.54						98.99	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
179	Roc Noir, Dent Blanche, Wallis, Switzerland.	Student.	L. Milch, N. J., I, p. 63, 1901.	Granite gneiss	
180	Besso, Dent Blanche, Wallis, Switzerland.	Student.	L. Milch, N. J., I, p. 59, 1901.	Granite gneiss.	
181	Cristallina Thal, St. Gotthard, Switzerland.	Grubenmann and Anderwert.	U. Grubenmann, Mt. Thurg. Nf. Ges., X, p. (17), 1892.	Granite.	In W. T., p. 195.
182	Monte Deruta, Umbria.	A. Ricciardi.	A. Verri, B. Soc. G. It., V, p. 54, 1886.	Granite.	In W. T., p. 139.
183	Groppo Maggio, Apennino Parmense, Italy.	M. Ferrari.	M. Ferrari, Mem. Ac. Linc. (5), VIII, No. 4, p. 176, 1910.	Granite.	Alkalies high, or Al_2O_3 low.
184	Groppo Maggio, Apennino Parmense, Italy.	M. Ferrari.	M. Ferrari, Mem. Ac. Linc. (5), VIII, No. 4, p. 176, 1910.	Granite.	
185	Groppo Maggio, Apennino Parmense, Italy.	M. Ferrari.	M. Ferrari, Mem. Ac. Linc. (5), VIII, No. 4, p. 176, 1910.	Granite.	
186	Crocetta, San Piero in Campo, Elba.	E. Manasse.	E. Manasse, Pr. Soc. Tosc., XII, p. 220, 1901.	Granite.	
187	Monte Capanne, Elba.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XVII, p. 223, 1900.	Microgranite.	Inclusion in granite below. Not in W. T.
188	Monte Capanne, Elba.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XVII, p. 223, 1900.	Granite.	Not in W. T.
189	Mola, Serra di Longone, Elba.	A. Funaro.	A. Funaro, B. C. G. It., XVII, p. 381, 1886.	Granite.	In W. T., p. 379.
190	Monte Sta. Lucia, Elba.	P. Aloisi.	P. Aloisi, Mem. Soc. Tosc., XXII, p. 152, 1906.	Granite.	Al_2O_3 high, alkalies?
191	Dagö, Esthonia, Russia.	Schridde.	J. J. Sederholm, T. M. P. M., XII, p. 21, 1891.	Rapakivi granite.	In W. T., p. 129.
192	Gnivani, Podolia, Russia.	N. N. Soboleva.	V. A. Selsky, A. G. Min. Rus., XIV, p. 9, 1912.	Hypersthene granite.	
193	Gnivani, Podolia, Russia.	N. N. Soboleva.	V. A. Selsky, An. G. Min. Rus., XIV, p. 9, 1912.	Hypersthene granite.	
194	Gnivani, Podolia, Russia.	N. N. Soboleva.	V. A. Selsky, An. G. Min. Rus., XIV, p. 9, 1912.	Hypersthene granite.	
195	Gnivani, Podolia, Russia.	N. N. Soboleva.	V. A. Selsky, An. G. Min. Rus., XIV, p. 9, 1912.	Hypersthene granite.	
196	Kamary, near Balaclava, Crimea, Russia.	A. Lagorio.	A. Lagorio, Cong. G. Int. VII, Guide XXXIII, p. 27, 1897.	Granitite.	In W. T., p. 171.
197	Tumagor Kaja, Caucasus.	Beljankin and L. Lessing.	L. Lessing, Vh. Rus. M. Ges., XLIV, p. 263, 1905.	Granite.	Leucocratic facies. Cf. next nos.

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
198 D4. V	68.55	18.12	n. d.	n. d.	0.30	1.61	2.89	4.64	1.21						97.33	
199 D4. V	59.11	16.33	n. d.	2.58	4.36	4.96	8.10		3.62						99.06	
200 B4. V	65.77	17.26	2.69	trace	2.50	2.39	4.97	3.12	0.70	0.43		0.15	0.01		100.00	
201 D4. V	54.31	24.15	6.53	trace	3.17	4.22	4.20	2.73	0.53	0.14		0.01	0.01		100.00	
202 B4. V	73.25	16.80	0.95	n. d.	1.50	n. d.	3.47	4.20	0.50						100.67	
203 B4. V	70.41	16.17	2.54	n. d.	0.86	2.11	3.45	4.29	0.66						100.49	
204 C3. V	69.15	16.60	0.22	1.36	2.21	3.55	3.57	3.91	0.50		0.39				101.46	
205 B4. V	64.48	18.39	4.67	n. d.	1.61	4.48	2.77	3.39	1.32						101.11	
206 B4. V	63.54	17.24	5.72	n. d.	1.70	4.31	3.22	2.90	1.30						99.93	
207 D4. V	76.7	11.7	1.0	0.6	trace	trace	6.5	4.5	0.2		0.2				101.4	
208 D4. V	76.5	11.0	1.3	0.25	0.1	trace	6.6	5.1	0.2		0.3	none			101.35	
209 B4. V	75.54	13.75	4.99	n. d.	0.69	0.94	1.55	3.34	0.28						101.08	
210 B4. V	75.30	11.40	5.40	n. d.	0.60	0.75	1.45	6.13	n. d.						101.03	2.67
211 B3. IV	70.46	14.91	1.17	2.66	0.25	0.84	1.04	9.32	0.55						101.20	
212 D4. V	77.18	14.87	0.53	n. d.	0.10	0.80	6.37	1.84	0.98				trace		(100.20) 102.67	
213 B4. V	74.92	11.92	3.72	n. d.	1.30	1.44	3.44	0.75	2.08				0.30		99.87	
214 B4. V	71.46	12.72	n. d.	1.68	0.86	1.64	7.27	2.39	0.86				0.50		99.38	
215 C4. V	58.94	20.30	5.50	n. d.	2.38	6.38	3.98	0.37	1.52				0.25		99.62	
216 C4. V	57.18	18.67	7.19	n. d.	2.48	7.02	3.60	0.54	1.60				1.25		99.53	

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
198	Tumagor Kaja, Caucasus.	Beljankin and L. Lessing.	L. Lessing, Vh. Rus. M. Ges., XLII, p. 280, 1905.	Granite.	Leucocratic facies.
199	Tumagor Kaja, Caucasus.	D. Beljankin.	L. Lessing, Vh. Rus. M. Ges., XLII, p. 263, 1905.	Granite.	Melanocratic facies.
200	Kaputschi Dag, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 156, 1888.	Granite.	"SiO ₂ includes loss." 3 decimals. Not in W. T.
201	Kaputschi Dag, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 155, 1888.	Granite.	"SiO ₂ includes loss." 3 decimals. Not in W. T.
202	Filfila, near Philippeville, Algeria.	P. Termier.	P. Termier, C. R., CXXXIV, p. 373, 1902.	Granite.	
203	Cap Marsa, Menerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 98, 1900.	Granite.	In W. T., p. 379.
204	Ain Kechera, Beni Toufout, Algeria.	P. Termier.	P. Termier, C. R., CXXXVI, p. 329, 1903.	Microgranite.	
205	Sidi Mokren, Menerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 18, 1900.	Granite.	In W. T., p. 381.
206	Ain Tolba, Menerville, Algeria.	Not stated.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 18, 1900.	Granite.	In W. T., p. 381.
207	Gebel Doukhan, Egypt.	Not stated.	Couyat, C. R. CXLVII, p. 869, 1908.	Microgranite.	
208	Gebel Doukhan, Egypt.	Not stated.	Couyat, C. R., CXLVII, p. 868, 1908.	Micropegmatite.	
209	St. Thomas Mount, Madras, India.	T. L. Walker.	T. H. Holland, Mem. G. S. Ind., XXVIII, p. 142, 1900.	Charnockite.	In W. T., p. 381. Cf. No. 80, I.3.2.3.
210	St. Thomas Mount, Madras, India.	P. C. Roy.	T. H. Holland, Mem. G. S. Ind., XXVIII, p. 142, 1900.	Charnockite.	In W. T., p. 125. Cf. No. 80, I.3.2.3.
211	Angara River, Jenissei District, Siberia.	A. E. Nikitinsky.	A. Meister, Reg. Aurib. Sib., IX, p. 196, 1910.	Granite.	Center of dike. Cf. No. 71, I. 4.1.4.
212	Nandogi River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 54.	Granite.	
213	Wangotschan River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 54.	Granite.	
214	Lantar River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 54.	Granite.	
215	Odori River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 54.	Granite.	
216	Odori River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 54.	Granite.	

GRANITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
217 C3. V	72.38	14.77	1.98	0.70	1.13	1.38	3.50	3.95	1.54		trace	trace	0.26		101.59	
218 A73. III?	73.56	1.42	1.27	14.30	0.79	2.50	5.09	0.38	0.84	0.13					100.28	
219 A73. III?	71.80	2.46	1.93	14.28	0.22	2.96	3.02	1.54	1.01	0.20					99.42	
220 C4. V	59.40	20.87	n. d.	5.80	2.21	0.40	2.71	2.63	0.85			0.11		B ₂ O ₃ 4.14	99.12	
221 C4. V	76.71	20.08	1.70	n. d.	0.06	0.56	0.07	0.11	0.24	0.21	0.66				100.40	2.81
222 D4. V	73.03	13.56	1.80	n. d.	0.28	0.82	5.35	3.95	3.50		1.20		0.30		103.79	

QUARTZ PORPHYRY.

1 B3. IV	69.28	15.53	2.88	0.69	0.93	2.15	7.16	0.25	1.44						100.51	
2 B3. IV	67.64	18.68	1.80	1.38	1.04	0.39	4.16	1.61	1.92					CO ₂ S trace 1.71	100.33	
3 A4. IV	93.20	2.86	0.79	n. d.	0.27	0.68	n. d.	n. d.	n. d.		0.12	none			97.92	
4 A4. IV	80.63	6.22	1.59	n. d.	3.27	3.69	n. d.	n. d.	n. d.		0.21	0.02			95.63	
5 A4. IV	83.04	6.92	1.34	n. d.	1.98	3.20	n. d.	n. d.	n. d.		0.12	0.04			96.64	
6 D4. V	74.21	12.77	2.51	2.04	1.04	0.98	2.17	5.44					trace		101.16	
7 D3. V	77.35	10.89	1.98	2.82	0.09	0.70	4.24	3.38	0.26	0.05			0.13		101.89	
8 D4. V	74.9	11.1	1.6	1.5	n. d.	0.2	8.5	trace	0.3		0.5		1.9		100.4	
9 B3. IV	69.54	14.77	6.58	0.46	0.29	1.34	3.03	4.24	0.18						100.55	
10 B3. IV	68.61	14.84	1.48	5.40	0.63	1.65	3.70	2.28	0.26						99.08	
11 D4. V	67.20	14.95	5.19	n. d.	2.39	0.30	4.00	0.89	2.13					CO ₂ 0.40	97.45	
12 B4. V	72.57	11.51	5.25	n. d.	trace	0.44	6.01	5.25	n. d.						101.03	2.571

GRANITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
217	Masan-pho, Korea.	G. Tsukamoto.	B. Koto, J. Coll. Sci. Tok., XXVI, p. 191, 1909.	Masanite (granite).	
218	Bagan, Lepanto Province, Luzon, Philippine Islands.	Government laboratory.	A. J. Eveland, Min. Bur. Manila B. 4, p. 41, 1905.	Granite.	Al_2O_3 , Fe_2O_3 , and FeO uncertain.
219	Bagan, Lepanto Province, Luzon, Philippine Islands.	Government laboratory.	A. J. Eveland, Min. Bur. Manila B. 4, p. 41, 1905.	Granite.	Al_2O_3 , Fe_2O_3 , and FeO uncertain.
220	Lau Alas, Sumatra.	F. Riegner.	F. Riegner, In. Diss. Bres., p. 51, 1909.	Schlieren in granite.	Tourmaline bearing. Cf. No. 270, I.4.1.3.
221	Leonora, Western Australia.	C. C. Williams.	C. F. V. Jackson, W. Aust. G. S. B. 13, p. 19, 1904.	Granite.	Crushed.
222	Snares Island.	R. C. Aston.	R. C. Aston, Subant. Islids., II, p. 769, 1903.	Granite.	Weathered.

QUARTZ PORPHYRY.

1	Thomas Township, Porcupine Area, Ontario.	Not stated.	A. G. Burrows, Rep. Bur. Min. Ont., XXI (1), p. 218, 1912.	Granophyre.	
2	Dome Mine, Porcupine, Ontario.	Not stated.	A. G. Burrows, Rep. Bur. Min. Ont., XXI (1), p. 213, 1912.	Quartz porphyry.	
3	Mount Orient, Pelham, Massachusetts.	E. T. Allen.	B. K. Emerson, A. J. S., XL, p. 215, 1915.	Northfieldite.	Igneous quartz rock.
4	Mount Orient, Pelham, Massachusetts.	E. T. Allen.	B. K. Emerson, A. J. S., XL, p. 215, 1915.	Northfieldite.	Igneous quartz rock.
5	Mount Orient, Pelham, Massachusetts.	E. T. Allen.	B. K. Emerson, A. J. S., XL, p. 215, 1915.	Northfieldite.	Igneous quartz rock.
6	Blue Hills, Massachusetts.	Students.	W. O. Crosby, Bost. Soc. Nh., Occ. Pap., IV., p. 362, 1900.	Quartz porphyry.	Mean of many poor deter- minations. In W. T., p. 381.
7	East Greenwich, Rhode Island.	J. H. Perry.	Emerson and Perry, U. S. G. S. B. 311, p. 66, 1907.	Quartz porphyry.	
8	Llano, Texas.	S. H. Worrell.	J. P. Iddings, J. G., XII, p. 228, 1904.	Quartz porphyry.	Cf. No. 55, I.4.1.3.
9	French Mills, Missouri.	Technical.	E. Haworth, Mo. G. S. A. R. VIII, p. 181, 1895.	Quartz porphyry.	Not in W. T.
10	Piedmont, Missouri.	Technical.	E. Haworth, Mo. G. S. A. R. VIII, p. 181, 1895.	Quartz porphyry.	Not in W. T.
11	Flagstaff Hill, Boulder, Colorado.	Palmer and Fulton.	Palmer and Fulton, Pr. Col. Sc. Soc., III, p. 356, 1890.	Quartz porphyry.	In W. T., p. 381
12	Copper Mountain, Similkameen District, British Columbia.	O. N. Scott.	O. N. Scott, Can. Min. Inst., V, p. 496, 1902.	Quartz porphyry.	

QUARTZ PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13 D4. V	71.65	14.10	4.42	n. d.	trace	0.51	6.64	4.54					trace		101.87	2.510
14 B4. V	72.01	15.51	n. d.	1.36	0.51	1.35	2.36	4.71	1.24					CO ₂ 0.33	99.38	
15 B3. IV	68.68	16.28	0.66	2.55	0.81	2.24	2.88	4.07	0.68		0.05			CO ₂ 0.17	99.07	
16 D4. V	73.97	12.09	2.90	n. d.	1.03	n. d.	3.38	3.55	1.54						98.46	
17 B3. IV	74.15	10.07	0.86	n. d.	0.30	1.28	6.64	4.44	0.71		0.93	0.09	0.26	CO ₂ trace ZrO ₂ none Cl 0.13 FeS ₂ trace BaO 0.04 SrO 0.06 Pb none	99.96	
18 B4. V	66.25	18.74	1.36	n. d.	0.50	1.23	3.04	8.80	0.22						100.14	
19 D4. V	77.72	11.53	n. d.	2.18	2.40	0.53	4.37	2.57	0.48		trace	0.19	trace		101.97	
20 C3. V	68.35	17.61	3.44	0.65	1.03	1.22	3.12	2.22	1.12		trace	0.17			98.93	
21 B4. V	76.74	14.07	1.12	n. d.	0.16	0.23	2.16	4.02	0.78						99.28	
22 C3. V	72.66	18.98	0.57	0.21	0.47	0.03	0.21	5.91	0.86					SO ₃ 0.02	99.94	
23 B4. V	67.9	15.7	3.0	n. d.	1.5	1.4	1.5	5.6	3.7						100.3	
24 C3. V	58.3	22.7	3.2	0.9	0.5	7.5	4.8	1.4	0.8						100.1	
25 C4. V	78.50	14.03	0.51	n. d.	1.12	n. d.	0.33	2.55	4.20						101.29	
26 C4. V	72.23	15.10	1.95	n. d.	1.17	0.30	1.20	6.95	2.37						101.25	
27 D4. V	71.55	14.80	2.60	n. d.	1.38	0.29	3.05	6.25	1.65						101.57	
28 D4. V	70.80	16.55	2.42	n. d.	1.40	0.31	1.72	5.20	3.10						101.50	
29 D4. V	75.30	11.01	1.12	n. d.	0.60	1.01	8.82	2.97	1.18						102.01	
30 D4. V	81.6	13.3	1.6	0.8	0.1	0.2	0.8	0.9	2.5						101.8	
31 D4. V	88.40	4.85	1.61	n. d.	0.39	n. d.	0.54	2.45	1.30						99.54	

QUARTZ PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	Copper Mountain, Similkameen District, British Columbia.	O. N. Scott.	O. N. Scott, Can. Min. Inst., V, p. 496, 1902.	Porphyry.	
14	Eureka District, Nevada.	A. A. Blair.	A. Hague, U. S. G. S. Mon. 20, p. 228, 1892.	Granite porphyry.	Not in W. T.
15	Wood Cone, Eureka District, Nevada.	A. A. Blair.	A. Hague, U. S. G. S. Mon. 20, p. 228, 1892.	Granite porphyry.	Not in W. T.
16	Regis Point, St. Thomas, West Indies.	P. T. Cleve.	P. T. Cleve, Sv. Vet. Ak. Hndl., IX, No. 12, p. 34, 1871.	Quartz porphyry.	Not in W. T.
17	Mazaruni District, British Guiana.	J. B. Harrison (assistant of).	J. B. Harrison, Goldf. Br. Gui., p. 76, 1908.	Aplite.	Alkalies incorrect. In W. T., p. 219.
18	Rio Pardo, Serra de Caldas, Brazil.	E. Hussak.	E. Hussak, N. J., 1900, I, p. 25.	Leucite granite porphyry.	Calculated partial anal. In W. T., p. 199.
19	Estancia Machuca, Pitonoaga River, Paraguay.	M. Goldschlag.	M. Goldschlag, In. Diss. Jena, p. 14, 1913.	Aplite.	
20	Estancia La Paz, Sierra Quinze, Puntas, Paraguay.	M. Goldschlag.	M. Goldschlag, In. Diss. Jena, p. 19, 1913.	Quartz porphyry.	
21	Craigian-oan, Invernesshire, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc. Edin., VIII, p. 56, 1901.	Quartz porphyry.	
22	Linhope, Cheviot Hills, Scotland.	I. Macadam.	H. Kynaston, Tr. G. Soc. Edin., VII, p. 401, 1899.	Quartz felsite.	In W. T., p. 215.
23	Coquet, Cheviot Hills, Scotland.	Waller.	J. J. H. Teall, G. Mag., XXII, p. 111, 1885.	Quartz felsite.	In W. T., p. 381.
24	Semaphore, St. Quay, Brittany.	Not stated.	J. de Lapparent, B. Soc. M. Fr., XXXIII, p. 265, 1910.	Aplite.	
25	Gueret, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Porphyry	
26	Roche d'Oradoux, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XII, No. 83, p. 76, 1902.	Porphyry.	
27	Villetelle, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Porphyry.	
28	Naleichard, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Porphyry.	
29	La Rivoire, Pelvoux, Dauphiny, France.	Rüst.	P. Termier, B. Soc. G. Fr., XXVII, p. 404, 1899.	Aplite.	
30	Saint Pierre du Chemin, Vendée, France.	J. de Lapparent.	J. de Lapparent, B. Soc. M. Fr., XXXII, p. 220, 1909.	Porphyroid.	
31	Defends-Boutouris, Esterel, France.	Pisani.	A. Michel-Levy, B. Soc. G. Fr., XXI.	Pyromeride.	

QUARTZ PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
32 D4. V	78.25	13.22	n. d.	1.11	0.26	1.29	3.88	4.00	0.48						102.49	
33 B4. V	75.81	13.70	n. d.	2.24	trace	0.72	3.96	4.13	n. d.						100.56	
34 B4. V	75.81	13.15	n. d.	1.16	0.35	0.89	3.66	5.43	0.40						100.85	
35 B4. V	75.23	16.13	n. d.	trace	0.13	0.88	3.87	3.77	0.83						100.84	
36 B4. V	75.21	13.88	n. d.	0.91	0.25	1.19	3.96	4.50	0.24						100.14	
37 B4. V	73.85	15.23	n. d.	1.14	0.29	1.68	3.27	4.10	0.36						99.92	
38 D4. V	73.25	14.39	n. d.	2.21	0.53	2.36	3.02	5.94	1.11						102.81	
39 D4. V	71.64	17.12	n. d.	trace	n. d.	1.62	3.87	3.95	n. d.						98.20	
40 B4. V	71.48	14.82	n. d.	2.42	0.27	0.93	4.00	5.69	0.35						99.96	
41 C4. V	71.03	15.24	n. d.	2.58	0.43	1.39	4.29	6.12	0.27						101.35	
42 D4. V	68.87	16.49	n. d.	2.62	0.32	2.25	4.13	5.89	0.83						101.40	
43 B4. V	69.81	14.78	n. d.	3.15	0.98	2.94	3.23	4.63	0.78						100.80	
44 D4. V	67.78	15.88	n. d.	3.97	1.25	2.90	3.95	4.95	1.32						102.00	
45 C4. V	73.69	14.26	0.73	0.41	trace	trace	3.76	7.84	0.31						101.00	2.626
46 C4. V	74.40	11.25	2.01	n. d.	2.00	2.40	3.27	3.40	2.37		0.13				101.23	
47 C2. IV	75.44	12.33	0.49	1.00	0.52	trace	2.38	7.13	1.26		0.07		0.11	FeS ₂ 0.66	101.73	
48 C4. V	76.40	15.68	0.78	n. d.	n. d.	n. d.	4.92	1.10	0.88					S trace	99.76	2.603
49 C4. V	72.08	16.15	2.21	n. d.	0.68	0.18	0.21	5.23	2.40						99.14	2.594
50 C4. V	73.03	14.33	2.64	n. d.	0.41	0.74	2.97	2.07	2.58		trace		0.69		99.46	2.654
51 C2. IV	76.27	11.94	1.66	0.21	0.62	0.08	4.40	2.90	0.30	0.08	0.22	1.19		CO ₂ 0.19 SO ₂ 0.12	100.18	

QUARTZ PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
32	Arete du Chatelet, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 107, 1898.	Quartz porphyry.	Whole series unreliable. In W. T., p. 381.
33	Arete de la Brea, y, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 107, 1898.	Quartz porphyry.	In W. T., p. 381.
34	Chalets de Planereuse, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 107, 1898.	Quartz porphyry.	In W. T., p. 381.
35	Les Rognes, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 82, 1898.	Aplite.	In W. T., p. 377.
36	Aiguille du Tacul, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 82, 1898.	Aplite.	In W. T., p. 379.
37	Aiguille du Charmoz, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 82, 1898.	Aplite.	In W. T., p. 379.
38	Col du Gréhillon, Mont Blanc.	L. Duparc.	L. Duparc and Mrazec, Mass. Mt. Blanc, p. 108, 1898.	Quartz porphyry.	In W. T., p. 383.
39	Glacier du Trient, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 82, 1898.	Aplite.	In W. T., p. 379.
40	Les Six-Niers, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 108, 1898.	Quartz porphyry.	In W. T., p. 383.
41	La Maya, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 108, 1898.	Quartz porphyry.	In W. T., p. 383.
42	La Maya, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 107, 1898.	Quartz porphyry.	In W. T., p. 383.
43	Arete du Chatelet, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 107, 1898.	Quartz porphyry.	In W. T., p. 383.
44	L'Amone, Mont Blanc.	L. Duparc.	Duparc and Mrazec, Mass. Mt. Blanc, p. 108, 1898.	Quartz porphyry.	In W. T., p. 383.
45	Ajaccio, Corsica.	G. Rupprecht.	G. Rupprecht, In. Diss. Erl., p. 11, 1889.	Quartz porphyry.	In W. T., p. 381.
46	Arditurri, La Haya, Guipuzcoa, Spain.	Pisani.	P. Termier, B. Soc. G. Fr. (4), VII, p. 13, 1907.	Aplite.	
47	Drammen, Norway.	P. Jannasch.	W. C. Brögger, Z. K., XVI, p. 77, 1890.	Quartz porphyry.	In W. T., p. 143.
48	Goldstein, Bruchhäuser Steine, Westphalia.	A. Bömer.	O. Mügge, N. J. B. B., X, p. 776, 1896.	Quartz porphyry.	In W. T., p. 381.
49	Near Goldstein, Bruchhäuser Steine, Westphalia.	A. Bömer.	O. Mügge, N. J. B. B., X, p. 776, 1896.	Quartz porphyry.	In W. T., p. 381.
50	Oberhunden, Westphalia.	A. Bömer.	O. Mügge, N. J. B. B., VIII, p. 568, 1893.	Quartz porphyry.	Meta- morphosed. In W. T., 381.
51	Ludwigsweg, Rossdorf, Hesse.	F. Stadler.	G. Klemm, Erl. G. Kt. Hes., Bl. Rossdorf, p. 46, 1912.	Aplite.	P ₂ O ₅ high, CaO low.

QUARTZ PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
52 C2. IV	75.61	10.80	1.25	0.73	0.73	0.32	1.78	5.54	0.33	0.11	0.22	2.00		CO ₂ 0.25 SO ₃ 0.09	99.76	2.60
53 D4. V	75.76	12.24	n. d.	2.06	0.29	2.51	3.13	4.22	n. d.				0.44	CO ₂ 0.83	101.48	
54 D3. V	70.92	14.62	3.74	0.61	0.43	1.75	5.60	2.38	1.60			0.38	0.25		101.63	
55 B4. V	69.40	15.79	2.15	n. d.	2.36	4.68	1.34	2.76	1.44						99.92	
56 C3. V	66.83	16.40	3.17	1.89	1.07	2.59	4.65	4.21	0.51						101.32	
57 D4. V	66.45	20.85	2.67	1.73	trace	2.53	trace	3.88	0.21				0.45		98.77	
58 C4. V	65.23	15.10	5.01	3.99	n. d.	3.19	1.85	5.67	0.18				0.74		100.96	
59 C4. V	63.45	12.40	4.20	n. d.	0.67	1.53	4.36	5.91	1.24						98.76	
60 C3. V	65.37	17.06	1.70	1.12	0.40	2.47	4.81	6.94	1.41						101.28	
61 D4. V	75.51	18.10	2.69	n. d.	0.12	0.36	0.16	1.23	n. d.				0.82		98.99	
62 C3. V	71.10	15.92	3.17	0.34	trace	0.88	3.17	6.11	0.11					CO ₂ 0.45	101.25	
63 B4. V	77.94	11.78	1.21	n. d.	0.32	0.74	1.56	4.17	1.91						99.63	2.557
64 B4. V	77.61	13.34	2.07	n. d.	0.52	3.67	0.61	2.04	0.55						100.41	2.556
65 B4. V	76.94	12.20	2.34	n. d.	0.32	0.57	1.47	4.65	1.15						99.64	2.451
66 B4. V	72.10	13.98	2.08	2.38	1.02	2.41	1.07	3.29	1.65						99.98	2.551
67 B3. IV	76.59	11.43	0.47	2.12	0.64	2.78	0.97	3.76	1.39						100.15	2.565
68 B4. V	76.33	12.84	2.22	n. d.	0.37	2.96	1.09	3.42	0.83						100.06	2.557
69 B3. IV	75.05	13.16	1.63	3.07	0.38	1.80	0.92	2.58	1.57						100.16	2.468
70 B4. V	74.81	13.87	1.68	n. d.	0.52	1.49	1.46	4.68	1.48						99.99	2.541
71 B4. V	74.58	13.31	1.31	n. d.	0.54	1.48	1.34	4.73	2.84						100.13	2.505

QUARTZ PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
52	Bollersbach, Hesse-Nassau.	F. Stadler.	R. Brauns, N. J. B. B., XXVII, p. 315, 1909.	Quartz porphyry.	P ₂ O ₅ high. CaO low.
53	Libsic, Moldautal, Bohemia.	Plaminck.	J. Klvana, Ref. N. J., I, p. 485, 1898.	Felsophyre.	In W. T., p. 381.
54	Premyzlauer Schlucht, Moldautal, Bohemia.	Kolar.	J. Klvana, Ref. N. J., I, p. 485, 1898.	Felsophyrite.	In W. T., p. 395.
55	Radworza, Bachergebirge, Styria.	A. Pontoni.	A. Pontoni, T. M. P. M., XIV, p. 370, 1895.	Granite porphyry.	In W. T., p. 141.
56	Javoria, Carinthia.	H. V. Grater.	H. V. Grater, Jb. G. R.-A. Wien. XLVII, p. 278, 1897.	Quartz porphyry.	In W. T., p. 381.
57	Rozsnyo Valley, Erzgebirge, Hungary.	E. Ernyei.	F. Schafarzik, Math. Nh. Ber. Ung., XXIII, p. 232, 1905.	Quartz porphyry.	
58	Csucsom Valley, Erzgebirge, Hungary.	E. Ernyei.	F. Schafarzik, Math. Nh. Ber. Ung., XXIII, p. 232, 1905.	Quartz porphyry.	
59	Zalas, near Cracow, Galicia.	R. Zuber.	R. Zuber, Jb. G. R.-A. Wien, XXXV, p. 747, 1885.	Quartz porphyry.	In W. T., p. 381.
60	Allochet, Monzoni, Tyrol.	C. Doelter.	C. Doelter, Anz. Ak. W. Wien, XXXIX, p. 231, 1902.	Aplite.	
61	Golabara River, Serbia.	A. B. Griffiths.	A. B. Griffiths, Q. J. G. S., XLII, p. 566, 1886.	Porphyry.	In W. T., p. 381.
62	Malga Serra Caprile, Adamello, Piedmont.	C. Riva.	C. Riva, Ref. N. J., II, p. 63, 1897.	Quartz porphyry.	In W. T., p. 381.
63	Buccione, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (16), 1885.	Porphyry.	Alkalies? Whole series unreliable. In W. T., p. 135.
64	Buccione, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (17), 1885.	Porphyry.	In W. T., p. 143.
65	Arona, Lago Maggiore, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (8), 1885.	Porphyry.	In W. T., p. 125.
66	Arona, Lago Maggiore, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (8), 1885.	Porphyry.	In W. T., p. 139.
67	Near Bolzano, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen. XVIII, p. (18), 1885.	Porphyry.	In W. T., p. 139.
68	Near Bolzano, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (17), 1885.	Porphyry.	In W. T., p. 139.
69	Angera, Lago Maggiore, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (9), 1885.	Porphyry.	In W. T., p. 123.
70	Briga, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen. XVIII, p. (12), 1885.	Porphyry.	In W. T., p. 133.
71	Arolo, Lago Maggiore, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (9), 1885.	Porphyry.	In W. T., p. 133.

QUARTZ PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
72 B4. V	73.03	13.51	3.12	n. d.	0.26	1.61	1.52	4.87	2.03				trace		99.95	2.563
73 B3. IV	72.03	14.87	3.11	2.21	1.37	1.41	0.78	2.32	2.02				trace		100.12	2.523
74 B3. IV	71.91	13.51	2.14	1.14	1.18	2.19	1.58	3.72	2.39				trace		99.76	2.618
75 B4. V	70.10	16.25	n. d.	4.05	0.54	1.32	4.27	4.20	n. d.						100.73	
76 C3. V	74.25	16.20	0.07	0.92	0.90	0.77	3.87	3.40	0.87						101.25	
77 C3. V	72.6	13.9	0.8	0.8	trace	0.2	6.2	3.7	0.8						99.0	
78 C3. V	74.36	13.56	0.67	1.19	0.29	0.89	4.51	4.93	1.01			trace		CO ₂ trace	101.41	
79 B4. V	73.21	14.17			0.23	2.21	6.10	4.15	n. d.						100.07	
80 C4. V	65.59	14.05	2.94	2.35	0.62	3.35	4.37	5.27	n. d.						98.54	
81 C4. V	70.12	16.65	0.37	none	none	1.21	4.91	4.41	1.21						98.88	
82 C3. V	74.49	13.58	0.69	1.72	1.40	0.84	2.87	3.49	1.84			0.09	trace	CO ₂ 0.20	101.21	2.67
83 C3. V	69.29	14.47	n. d.	2.81	0.32	0.58	6.92	2.94	n. d.		0.52	trace			101.24	
84 B3. IV	72.12	9.75	4.11	3.22	trace	2.99	3.42	2.76	0.10				1.83		100.30	2.706
85 B3. IV	61.50	16.79	3.48	2.23	1.96	5.44	4.78	2.38	trace	0.36			1.22	CO ₂ trace	100.14	2.727
86 B3. IV	77.88	12.05	0.93	n. d.	0.62	trace	3.16	2.36	0.69	0.06	0.04			FeS ₂ 1.35	99.14	2.70

RHYOLITE.

1 B3. IV	73.62	12.22	2.08	4.03	0.26	0.34	3.57	2.57	0.40						99.09	
2 C3. V	73.65	11.19	1.31	3.25	0.51	2.78	3.74	1.86	0.44						98.73 (99.23)	
3 D4. V	73.09	13.43	2.57	1.03	2.29	3.85	1.58	0.76							98.60	

QUARTZ PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
72	Ponte di Grata, Gozzano, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (14), 1885.	Porphyry.	In W. T., p. 133.
73	Inorio Superiore, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (21), 1885.	Porphyry.	In W. T., p. 123.
74	Inorio Superiore, Lago d'Orta, Piedmont.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. (21), 1885.	Porphyry.	In W. T., p. 135.
75	Mola, Serra Longone, Elba.	A. Funaro.	A. Funaro, B. C. G. It., XVII, p. 381, 1886.	Quartz porphyry.	In W. T., p. 383.
76	Ain Kechera, Beni Toufout, Algeria.	P. Termier.	P. Termier, C. R., CXXXVI, p. 329, 1903.	Aplite.	
77	Kawalib, Kordofan.	M. Schweig.	G. Linck, N. J. B. B., XVII, p. 417, 1903.	Granite porphyry.	
78	Addi Salli, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 71, 1909.	Aplite.	
79	Kara Tioubé, near Samarkand, Turkestan.	Not stated.	K. I. Timofeef, Ann. G. M. Rus., XII, p. 82, 1910.	Aplite.	
80	Kara Tioubé, near Samarkand, Turkestan.	Not stated.	K. I. Timofeef, Ann. G. M. Rus., XII, p. 82, 1910.	Granite porphyry.	
81	Angara River, Jenissei District, Siberia.	N. E. Podkopaev.	A. Meister, Reg. Aurif. Sib., IX, p. 205, 1910.	Aplite.	
82	Ta-ho-yi, Nan Shan, Tibet.	C. Pfeil.	K. Futterer, Durch Asien, II (2), p. 32, 1909.	Quartz porphyry.	
83	Astüria, Thian Shan, Tibet.	C. Pfeil.	K. Futterer, Durch Asien, II (1), p. 220, 1905.	Quartz porphyry.	
84	Two Mile Flat, Cudgong River, New South Wales.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XVI, p. 44, 1883.	Felsite.	MnO high. In W. T., p. 219.
85	Mount Lambie, Rydal, New South Wales.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XVI, p. 44, 1883.	Quartz porphyry.	MnO high. In W. T., p. 245.
86	Norseman, Western Australia.	E. S. Simpson.	W. D. Campbell, W. Aust. G. S. B. 21, p. 119, 1906.	Felsite.	

RHYOLITE.

1	Pine Mountain, South Mountain, Pennsylvania.	C. H. Henderson.	C. H. Henderson, Tr. Am. Inst. M. E., XII, p. 90, 1884.	Rhyolite.	In W. T., p. 131.
2	Berlin, Wisconsin.	S. Weidman.	S. Weidman, Wisc. G. S. B. III, p. 2, 1898.	Rhyolite gneiss.	In W. T., p. 141.
3	Utley, Green Lake County, Wisconsin.	S. Weidman.	S. Weidman, Wisc. G. S., B. III, p. 14, 1898.	Metarhyolite.	Cf. U. S. G. S. B. 150, p. 169, 1898. In W. T., p. 383.

RHYOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
4 B3. IV	71.14	19.58	1.25	0.88	0.37	2.14	2.34	2.62	n. d.					CO ₂ 0.04	100.36	
5 A4. IV	71.01	15.17			0.34	1.19	2.77	2.97	6.34						99.79	
6 B4. V	75.07	12.15	1.62	n. d.	0.14	0.86	4.12	4.57	1.34				0.05		99.92	
7 B4. V	69.85	13.34	0.73	n. d.	trace	0.87	5.58	2.68	6.15						99.20	2.32
8 B4. V	75.69	12.26	n. d.	2.93	n. d.	1.13	3.01	4.74	n. d.			0.06			99.82	
9 B4. V	73.09	14.47	n. d.	2.99	n. d.	1.13	2.77	5.07	n. d.						99.52	
10 A4. IV	73.91	15.29	n. d.	0.89	n. d.	0.77	3.62	4.79	1.19			0.07			100.53	
11 B4. V	73.20	14.59	n. d.	1.92	1.24	0.47	0.12	4.32	2.98					CO ₂ 0.32	99.16	
12 B3. IV	68.15	15.00	1.18	0.60	0.87	1.91	3.13	0.96	8.70						100.50	2.497
13 B3. IV	76.36	10.43	0.54	0.98	0.88	0.97	6.01	3.07	0.33					S 0.07	99.64	2.489
14 B4. V	74.59	12.88	0.80	n. d.	0.30	0.76	3.30	5.35	1.03						99.01	2.324
15 B4. V	72.14	15.93	1.99	n. d.	0.40	1.93	3.97	2.55	n. d.				0.43		99.34	
16 B3. IV	71.14	12.08	3.35	n. d.	0.34	1.10	4.97	3.84	0.82		0.48				99.02	
17 D3. V	69.70	14.78	2.98	n. d.	0.59	1.07	4.77	4.45	n. d.		0.38				98.72	
18 C3. V	62.72	15.69	5.25	n. d.	1.34	3.33	5.45	4.19	n. d.		1.06				99.03	
19 B4. V	75.31	13.62	2.31	n. d.	0.20	0.97	3.02	4.07	1.48					S trace	100.98	2.525
20 C3. V	72.37	11.64	1.42	1.08	0.52	1.30	4.15	3.98	4.86						101.32	2.365
21 C3. V	72.6	12.4	0.7	1.1	trace	0.9	1.7	4.7	5.2						99.3	2.340
22 B4. V	67.9	15.7	3.0	n. d.	1.5	1.4	1.5	5.6	3.7						100.3	

RHYOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
4	Alloa, Fox River valley, Wisconsin.	W. W. Daniels.	Hobbs and Leith, B. Un Wisc. No. 158, p. 262, 1907.	Aporhyolite breccia.	
5	Bozeman, Montana.	F. W. Clarke.	A. C. Peale, U. S. G. S. B. 148, p. 141, 1897.	Rhyolite dust.	In W. T., p. 383.
6	Summit County, Colorado.	Teplitz.	A. Lagorio, T. M. P. M., VIII, p. 454, 1887.	Nevadite.	In W. T., p. 383.
7	Berkeley, California.	C. Palache.	C. Palache, B. Dep. G. Un. Cal., I, p. 67, 1894.	Soda rhyolite.	In W. T., p. 385.
8	Rescue Canyon, Eureka District, Nevada.	R. W. Mahon.	A. Hague, U. S. G. S. Mon. 20, p. 264, 1892.	Rhyolite.	Not in W. T.
9	South Hill, Eureka District, Nevada.	R. W. Mahon.	A. Hague, U. S. G. S. Mon. 20, p. 264, 1892.	Rhyolite.	Not in W. T.
10	Pinto Peak, Nevada.	E. Hart.	J. P. Iddings, U. S. G. S. B. 150, p. 162, 1898.	Liparite.	In W. T., p. 385.
11	Tonopah, Nevada.	G. S. Young.	J. A. Burgess, Ec. G., IV, p. 693, 1909.	Rhyolite.	Altered.
12	Oaxaca, Mexico.	A. Röhrig.	H. Lenk in Felix and Lenk, Btr. G. Mex., II, p. 129, 1899.	Rhyolite.	In W. T., p. 137.
13	Tablon de Itulgache, Guamania Volcano, Ecuador.	F. v. Wolff.	E. Esche in W. Reiss, Ecuador, I, p. 70, 1901.	Liparite.	
14	Tablon de Itulgache, Guamani Volcano, Ecuador.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 444, 1887.	Obsidian.	In W. T., p. 385.
15	Kaldadalur, Iceland.	R. Breon.	R. Breon, G. d'Islands, p. 29, 1884.	Obsidian.	In W. T., p. 385.
16	Raudhfossafjoll, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 658, 1891.	Obsidian.	In W. T., p. 155.
17	Hrafninnuhraun, near Hecla, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 641, 1891.	Liparite.	In W. T., p. 385.
18	Namshraun, Iceland.	H. Bäckström.	H. Bäckström, G. F. F., XIII, p. 645, 1891.	Liparite.	In W. T., p. 385.
19	Cir Mhor Dike, Arran, Scotland.	Under Thorpe.	J. W. Judd, Q. J. G. S., XLIX, p. 545, 1893.	Quartz felsite.	Center of dike. In W. T., p. 385.
20	Cir Mhor Dike, Arran, Scotland.	Under Thorpe.	J. W. Judd, Q. J. G. S., XLIX, p. 545, 1893.	Pitchstone porphyry.	In W. T., p. 385.
21	Arran, Scotland.	J. H. Player.	J. J. H. Teall, Brit. Petrol., p. 347, 1888.	Pitchstone.	In W. T., p. 385.
22	The Coquet, Cheviot Hills, Scotland.	T. Waller.	J. J. H. Teall, G. Mag., XXII, p. 111, 1885.	Quartz felsite.	Also in G. S. G. B. Mem. Sh. 5, p. 25, 1888. In W. T., p. 385.

RHYOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
23 D4. V	77.5	9.7	6.1	n. d.	n. d.	n. d.	0.3	5.8	0.4						99.8	
24 C4. V	79.35	12.65	2.00	n. d.	0.43	0.82	1.43	2.39	0.77		trace	0.02	trace	BaO trace SrO 0.23	100.14	
25 C3. V	74.09	14.98	1.80	1.50	trace	6.09	1.27	1.31							101.02	
26 B4. V	72.30	12.09	2.16	2.02	trace	3.41	4.80	1.69						FeS ₂ 0.90	99.37	
27 B4. V	72.33	13.78	4.02	n. d.	1.59	trace	1.64	5.05	1.34						99.75	
28 B4. V	72.06	14.87	1.33	n. d.	1.26	trace	4.11	5.90	0.26						99.79	
29 B4. V	76.4	14.2	1.6	n. d.	n. d.	0.6	1.8	4.2	1.5						100.3	
30 D4. V	75.97	15.29	2.54	n. d.	0.24	1.15	2.86	3.89	0.57						102.51	
31 C4. V	74.80	15.81	1.24	n. d.	0.38	0.42	3.67	4.04	0.30		0.06				101.17	
32 C4. V	72.75	13.20	1.16	n. d.	0.25	2.60	4.00	5.00	2.25						101.25	
33 D3. V	77.05	12.32	0.42	0.10	0.36	0.25	5.70	1.50	0.41						98.11	
34 D3. V	71.00	16.57	0.57	0.39	0.22	1.61	4.70	4.30	2.40						101.76	
35 C3. V	75.47	11.21	0.44	n. d.	0.30	0.80	2.98	7.98	0.85		none		0.11		100.14	
36 B4. V	71.44	12.90			n. d.	0.82	4.24	2.19	8.42						100.01	
37 D3. V	70.92	14.62	3.74	0.61	0.43	1.75	5.00	2.38	1.60			0.38	0.25		101.68	
38 B4. V	75.82	13.67			0.05	0.58	1.69	6.59	1.07						99.47	2.451
39 B4. V	72.98	14.13			0.17	1.73	3.44	3.45	3.85						99.45	2.408
40 B4. V	71.39	15.57			0.51	1.29	2.28	5.43	3.95						100.42	2.394
41 B4. V	76.66	10.85	0.96	n. d.	trace	0.32	0.49	9.58	0.61				trace	Li ₂ O trace	99.47	
42 B4. V	72.30	15.52	2.98	n. d.	trace	1.25	2.95	4.73	none						99.73	

RHYOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
23	Cwm-Silyn, Nantlle, Caernarvon, Wales.	Acton and Hewett.	A. Harker, Bala Volc. Ser., p. 13, 1889.	Rhyolite.	In W. T., p. 385.
24	Vadre, Deganwy, Caernarvon, Wales.	H. W. Greenwood.	C. B. Travis, Pr. Liv. G. Soc., X (5), p. 315, 1909.	Rhyolite.	
25	Pen-y-foel, St. Davids, Wales.	C. Gibbins.	C. L. Morgan, Q. J. G. S., XLVI, p. 262, 1890.	Felsitic tuff.	In W. T., p. 385.
26	Pen-y-foel, St. Davids, Wales.	C. Gibbins.	C. L. Morgan, Q. J. G. S., XLVI, p. 262, 1890.	Felsite.	In W. T. p. 385.
27	Carn Pica, near Fishguard, Pembrokeshire, Wales.	F. E. Tadman.	F. R. C. Reed, Q. J. G. S., LI, p. 178, 1895.	Felsite.	In W. T., p. 385.
28	Carn Gelli, near Fishguard, Pembrokeshire, Wales.	F. E. Tadman.	F. R. C. Reed, Q. J. G. S., LI, p. 177, 1895.	Felsite.	In W. T., p. 385.
29	Tardree, County Antrim, Ireland.	J. H. Player.	J. J. H. Teall, Brit. Petrog., p. 348, 1888.	Liparite.	In W. T., p. 385.
30	Cloughwater, County Antrim, Ireland.	A. P. Hoskins.	G. A. J. Cole, Tr. R. Dub. Soc. (2), VI, p. 112, 1896.	Rhyolite.	Not. in W. T.
31	Banne d'Ordauche, Mont Dore, Auvergne.	Pisani.	Michel-Levy and Lacroix, C. R., CXLVIII, p. 1721, 1909.	Rhyolite.	
32	Lusclade, Mount Dore, Auvergne.	Pisani.	Michel-Levy and Lacroix, C. R., CXLVIII, p. 1721, 1909.	Rhyolite.	
33	Cavicchia, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 60, 1907.	Rhyolite.	
34	Astenica, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 117, p. 57, 1907.	Rhyolite.	
35	Kolsjön, Smaland, Sweden.	H. Santesson.	O. Nordenskjöld, B. G. Inst. Ups., I, p. 216, 1894.	Hälfefinta (rhyolite).	Alkalies high. In W. T., p. 143.
36	Meissen, Saxony.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 490, 1887.	Pitchstone.	In W. T., p. 387.
37	Near Premyslau, Moldautal, Bohemia.	Kolar.	J. Klvana, Ref. N. J., 1898, I, p. 485.	Felsophyrite.	In W. T., p. 395.
38	Schemnitz, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 448, 1887.	Liparite.	In W. T., p. 387.
39	Hliniker Thal, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 454, 1887.	Liparite pitchstone.	In W. T., p. 387.
40	Hlinik, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 444, 1887.	Liparite perlite.	In W. T., p. 387.
41	Czeremosz River, Galicia.	J. Schramm.	R. Zuber, T. M. P. M., VII, p. 196, 1886.	Hälfefinta (rhyolite).	In W. T., p. 381.
42	Conti, Ponza, Ponza Islands.	Aichino.	V. Sabatini, B. C. G. It., XXIV, p. 246, 1893.	Rhyolite.	In W. T., p. 387.

RHYOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
43 C4. V	71.50	20.31	6.79	n. d.	n. d.	1.51	1.92	3.58	0.70						100.31	
44 B4. V	71.41	15.07	3.68	n. d.	trace	1.72	1.18	2.95	4.05						100.06	
45 B4. V	64.32	17.87	2.55	n. d.	trace	3.06	1.63	4.52	6.19						100.14	
46 B4. V	74.30	16.56			0.16	1.35	2.62	4.32	0.23						99.54	
47 B4. V	72.35	13.97	1.29	n. d.	0.46	0.72	3.58	5.38	1.37						99.12	2.33
48 B4. V	73.64	15.07	n. d.	1.63	0.65	2.63	3.06	2.91	0.54			0.34	trace		100.47	
49 C4. V	79.1	8.9	1.9	n. d.	0.7	trace	3.9	3.1	0.8				1.1		99.5	
50 C4. V	79.1	8.2	1.3	n. d.	0.9	1.1	3.4	2.2	(3.8)						100.00	
51 B4. V	76.84	5.87	3.92	0.87	0.52	3.34	5.41		1.69				0.73		99.19	
52 D4. V	70.03	18.63	0.11	n. d.	0.10	2.62	3.15		4.28						99.12	
53 C4. V	69.2	8.3	5.4	n. d.	trace	0.1	6.9	2.9	7.0						99.8	
54 C4. V	68.5	14.5	1.0	3.0	0.1	trace	9.2	3.0	n. d.						99.3	
55 B3. IV	70.30	6.32	9.23	1.40	0.89	0.84	7.70	2.50	0.82						100.00	2.69
56 B3. IV	69.61	8.02	7.17	2.83	0.65	0.88	7.47	2.88	0.74						100.25	2.44
57 B3. IV	69.02	10.09	4.42	4.56	0.76	1.45	6.29	3.70						CuO 0.29	100.58	2.46
58 B3. IV	68.75	5.91	5.81	5.33	0.08	2.11	7.52	4.28	n. d.					CuO 0.28	100.02	2.47
59 C3. V	68.33	10.94	3.74	5.41	0.16	1.36	7.09	4.08	n. d.					CuO 0.25	101.36	2.48
60 B3. IV	67.89	11.53	4.51	4.52	0.62	1.51	5.79	3.91	0.33						100.41	2.43
61 B3. IV	67.48	9.70	7.42	2.21	0.77	1.45	7.21	2.94	0.96						100.14	2.68
62 B4. V	67.18	14.18	4.00	2.48	n. d.	2.78	5.89	4.01	n. d.				0.34		100.86	2.40

RHYOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
43	Montagnielo, Ponza, Ponza Islands.	Aichino.	V. Sabatini, B. C. G. It., XXIV, p. 246, 1893.	Rhyolite.	In W. T., p. 387.
44	Cala d'Inferno, Ponza, Ponza Islands.	Aichino.	V. Sabatini, B. C. G. It., XXIV, p. 245, 1893.	Rhyolite tuff.	In W. T., p. 387.
45	Scogliatelle, Ponza, Ponza Islands.	Aichino.	V. Sabatini, B. C. G. It., XXIV, p. 252, 1893.	Retinite (rhyolite).	In W. T., p. 183.
46	Lipari, Aeolian Islands.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 491, 1887.	Obsidian.	In W. T., p. 387.
47	Monte Campo, Bianco, Lipari, Aeolian Islands.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 440, 1887.	Obsidian.	In W. T., p. 387.
48	Pietre Cotte, Monte della Fossa, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 104, 1892.	Rhyolite.	In W. T., p. 135.
49	Comende, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, B. C. G. It., XXV, p. 417, 1894.	Perlite.	Cf. No. 222, I.4.1.3. In W. T., p. 337.
50	Carloforte, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, B. C. G. It., XXV, p. 411, 1894.	Rhyolite.	H ₂ O by difference. In W. T., p. 387.
51	Spalmatore, San Pietro, Sardinia.	H. Fürth.	F. Eigel, T. M. P. M., VIII, p. 67, 1887.	Rhyolite.	In W. T., p. 387.
52	San Pietro, Sardinia.	Boetsch.	F. Eigel, T. M. P. M., VIII, p. 70, 1887.	Obsidian.	In W. T., p. 387.
53	Pescetti, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, B. C. G. It., XXVII, p. 186, 1896.	Perlite.	In W. T., p. 387.
54	Comende, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, Rend. Ac. Linc., V, p. 151, 1896.	Comendite.	Cf. No. 222, I.4.1.3. In W. T., p. 383.
55	Khartibugal, Cuddia Nera, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 173, 1884.	Pantellerite.	Cf. J. G., XXII, p. 20, 1914. In W. T., p. 219.
56	Khartibugal, Cuddia Nera, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 173, 1884.	Pantellerite.	Cf. J. G., XXII, p. 20, 1914. In W. T., p. 221.
57	Cuddia Mida, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 182, 1884.	Pantellerite.	Cf. J. G., XXII, p. 20, 1914. In W. T., p. 221.
58	Khagiar, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 179, 1884.	Pantellerite.	Cf. J. G., XXII, p. 20, 1914. In W. T., p. 311.
59	Khania, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 170, 1884.	Pantellerite.	Cf. J. G., XXII, p. 20, 1914. Not in W. T.
60	Monte Sant' Elmo, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 186, 1884.	Pantellerite.	Cf. J. G., XXII, p. 20, 1914. In W. T., p. 221.
61	Monte Sant' Elmo, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 186, 1884.	Pantellerite.	Cf. J. G., XXII, p. 20, 1914. In W. T., p. 221.
62	Cala Porticello, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 133, 1884.	Liparite.	Cf. J. G., XXII, p. 20, 1914. Not in W. T.

RHYOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
63 B3. IV	76.41	13.08	1.99	n. d.	0.61	0.82	4.41	1.02	0.70		0.40				99.40	
64 B3. IV	75.00	14.96	1.12	n. d.	1.41	0.83	4.83	0.70	1.62						100.47	
65 B4. V	66.70	18.30	2.12	n. d.	0.50	none	3.10	5.14	3.80						99.66	
66 B3. IV	76.40	12.08	0.76	0.45	0.58	0.19	0.15	7.65	1.14	0.47		0.13			100.00	
67 B3. IV	63.96	16.68	1.98	1.54	0.58	1.54	4.67	3.96	3.94	0.91		0.24			100.00	
68 C4. V	77.99	12.50	1.20	n. d.	0.09	1.21	2.99	4.95	0.48						101.41	
69 B4. V	77.50	12.83	1.66	n. d.	0.24	1.50	3.44	3.45	0.43						101.05	
70 B4. V	76.68	13.63	1.44	n. d.	0.23	0.99	2.85	4.91	0.36						101.09	
71 B4. V	75.49	15.27			0.18	1.26	2.61	4.12	0.82						99.75	
72 B4. V	73.58	13.73			0.17	1.85	2.41	3.32	5.62						100.68	
73 D4. V	71.08	13.46	1.57	1.38	0.31	0.95	6.38	4.55	2.10			trace	trace	SO ₂ Cl	trace trace	101.78
74 D4. V	75.9	11.5	3.4	0.9	0.1	n. d.	4.0	4.4	1.0						101.2	
75 C4. V	74.85	11.30	4.78	n. d.	1.53	1.01	2.34	4.25	1.29						101.35	
76 B4. V	74.87	14.23	1.75	n. d.	1.16	1.99	3.03	2.35	1.60						100.98	
77 B4. V	76.44	13.72	2.28	n. d.	trace	0.74	3.11	2.94	n. d.				0.08		100.11	2.55
78 B4. V	74.16	12.55	5.34	n. d.	0.46	2.32	2.31	0.62	1.56						99.32	
79 B4. V	75.36	14.21	0.13	n. d.	trace	0.84	4.78	2.72	1.04						99.13	
80 B4. V	72.78	14.15	0.17	n. d.	trace	0.82	4.51	2.48	4.35						99.26	
81 B4. V	78.15	11.94	0.72	0.33	0.20	1.32	0.67	5.71	0.14				1.58		100.76	2.355

RHYOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
63	Mount Kastel, Crimea.	R. Prendel.	R. Prendel, Ref. N. J., II, p. 95, 1887.	Liparite.	In W. T., p. 137.
64	Mount Kastel, Crimea.	R. Prendel.	R. Prendel, Ref. N. J., II, p. 96, 1887.	Liparite.	In W. T., p. 139.
65	Hagia Paraskevi, Mytilene, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 187, 1898.	Obsidian.	Not in W. T.
66	Alagez, Pambak Valley, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 155, 1888.	Rhyolite.	SiO ₂ includes loss. 3 places. Not in W. T.
67	Chomi, Kara Borjom Valley, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 154, 1888.	Pitchstone.	SiO ₂ includes loss. 3 places. Not in W. T.
68	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 77, 1900.	Liparite.	In W. T., p. 387.
69	Sidi Zerzor, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 115, 1900.	Liparite.	In W. T., p. 387.
70	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 77, 1900.	Liparite.	In W. T., p. 387.
71	Bon Konfor, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 26, 1900.	Liparite.	In W. T., p. 387.
72	Sidi Zerzor, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 115, 1900.	Liparite.	In W. T., p. 387.
73	Alid Volcano, Buia, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 116, 1909.	Anorthoclaseite pumice.	
74	Hol-hol, near Djibouti, French Somali.	H. Arsandaux.	H. Arsandaux, C. R., CXXXVII, p. 878, 1903.	Rhyolite.	
75	Somaliland.	Pisani.	Gennes and Bonard, C. R., CXXXI, p. 198, 1900.	Rhyolite.	Not in W. T.
76	Derike, near Teheran, Persia.	E. Drasche.	C. v. John, Jb. G. R.-A. Wien, XXXIV, p. 115, 1884.	Porphyry.	In W. T., p. 389.
77	Okhotsk, Siberia.	Y. F. Gervé.	K. E. Bogdanovitch, Fund. Marek., p. 25.	Liparite.	
78	Okhotsk, Siberia.	Y. F. Gervé.	K. E. Bogdanovitch, Fund. Marek., p. 19.	Marekanite.	
79	Marekanka River, Okhotsk, Siberia.	P. Wenjukoff.	P. Wenjukoff, Ref. N. J., I, p. 281, 1891.	Liparite glass.	In W. T., p. 389.
80	Marekanka River Okhotsk, Siberia.	P. Wenjukoff.	P. Wenjukoff, Ref. N. J., I, p. 281, 1891.	Perlite.	In W. T., p. 131.
81	Bongsoe Volcano, Palembang District, Sumatra.	J. G. Kramers.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Obsidian.	Not in W. T.

RHYOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
82 D4. V	76.51	12.37	0.48	1.58	trace	0.95	4.21	4.96	1.43		0.03				102.52	
83 D4. V	75.84	9.96	0.49	1.71	0.18	1.11	1.82	2.26	5.36						98.73	
84 B4. V	75.51	14.30	1.01	n. d.	0.24	1.81	1.21	2.89	2.84						99.81	
85 B3. IV	68.15	16.49	3.26	none	none	4.01	3.88	1.59	1.82				0.26		99.46	2.107
86 B3. IV	69.02	15.32	4.29	0.51	0.11	0.32	5.47	4.34	1.86		0.40			ZrO ₂ 0.16	101.80 (100.80)	

QUARTZ DIORITE.

1 D4. V	57.50	23.44	5.07	n. d.	2.76	5.62	2.01	0.45	2.25			2.02			101.12	2.856
2 B3. IV	52.25	17.97	0.81	8.89	6.46	7.27	3.61	1.71	1.80	0.04					100.81	
3 B4. V	56.69	15.48	6.22	n. d.	6.53	7.59	3.41	3.43	n. d.		0.62				99.97	
4 B4. V	56.18	22.79			6.53	6.49	3.40	3.27	n. d.		1.60				100.26	
5 B3. IV	64.98	20.51	0.50	2.35	0.93	4.23	5.22	1.84	0.11						100.67	
6 C4. V	55.47	22.63	3.96	n. d.	2.97	6.62	4.59	2.09	0.69						99.02	
7 B3. IV	64.45	17.18	3.32	0.60	0.75	4.31	4.24	2.98	0.59		trace	trace	1.62		100.04	
8 B3. IV	61.38	14.33	7.64	1.02	2.98	5.42	4.71	2.58	0.13				trace		100.19	
9 B3. IV	61.55	17.48	1.49	3.50	3.00	3.12	8.47	0.07	1.21	0.12		0.28			100.29	
10 B3. IV	61.73	18.87	2.63	2.64	1.09	5.93	4.24	3.16	0.22						100.51	
11 A4. IV	65.61	17.26	2.47	n. d.	2.50	7.66	4.19	1.09	n. d.						100.78	2.72
12 A4. IV	64.71	15.09	2.56	n. d.	1.16	4.51	5.29	1.38	4.86						99.56	2.72

RHYOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
82	Wai Polang, Leitimor, Ambon Island.	S. J. Vermaes.	R. D. M. Verbeek, Jb. Mijuw., XXXIV, p. 230, 1905.	Ambonite (liparite).	French edition, p. 243.
83	Wai Toulā, Hitou, Ambon Island.	O. Brunck.	R. D. M. Verbeek, Jb. Mijuw., XXXIV, p. 233, 1905.	Obsidian.	French edition, p. 246.
84	Tweed River, New South Wales.	W. F. Smeeth.	W. F. Smeeth, Pr. R. Soc. N. S. W., XXVIII, p. 311, 1894.	Pitchstone.	In W. T., p. 389.
85	Bondi, near Sydney, New South Wales.	A. Liversidge.	A. Liversidge, Pr. R. Soc. N. S. W., XX, p. 236, 1887.	Pumice.	Floated block. In W. T., p. 389.
86	Filhol Point, Campbell Island.	P. Marshall.	P. Marshall, Subant. Islds., II, p. 694, 1909.	Pantellerite.	

QUARTZ DIORITE.

1	Stop Island, Rainy Lake, Ontario.	F. T. Shutt.	A. C. Lawson, Am. G., VII, p. 158, 1891.	Quartz diorite.	Center of dike. Cf. No. 6, p. 1065. In W. T., p. 407.
2	James Township, Nipissing, Ontario.	R. E. Hore.	R. E. Hore, J. G., XVIII, p. 275, 1910.	Quartz diorite.	
3	South Leverett, Hampden County, Massachusetts.	W. Orr, jr.	B. K. Emerson, U. S. G. S. Mon. 29, p. 336, 1898.	Tonalite.	In W. T., p. 407.
4	Three Rivers, Belchertown, Massachusetts.	F. H. Fitts.	B. K. Emerson, U. S. G. S. Mon. 29, p. 336, 1898.	Tonalite.	In W. T., p. 407.
5	New York City New York.	V. Ziegler.	V. Ziegler, Ann. N. Y. Ac. Sci., XXI, p. 6, 1911.	Quartz diorite.	
6	Milledgeville Georgia.	T. L. Watson.	T. L. Watson, Ga. G. S. B. 9 A, p. 173, 1902.	Granodiorite.	
7	Pine Flats, San Gabriel Mountains, California.	A. M. Strong.	Arnold and Strong, B. G. S. A., XVI, p. 195, 1905.	Granodiorite.	MnO high.
8	Mount Wilson, San Gabriel Mountains, California.	A. M. Strong.	Arnold and Strong, B. G. S. A., XVI, p. 193, 1905.	Granodiorite.	Not fresh. Iron oxides incorrect. Cf. ref.
9	Oak Ridge, Calaveras Valley California.	W. O. Clark.	J. P. Smith, Pr. Am. Phil. Soc., XLV, p. 209, 1907.	Quartz diorite.	Alkalies? No quartz in norm.
10	Carrizal, Nuevo Leon, Mexico.	Not stated.	J. G. Aguilera, B. Soc. G. Mex., V, p. 85, 1909.	Quartz diorite.	
11	Philipsburg, St. Martin, West Indies.	P. T. Cleve.	P. T. Cleve, Sv. Vet. Ak. Hnd., IX, No. 12, p. 36, 1871.	Quartz diorite.	Cf. A. G. Hög- bom, B. G. Inst. Ups., VI, p. 230, 1905. Not in W. T.
12	Bucks Island, West Indies.	T. Nordstrom.	P. T. Cleve, Sv. Vet. Ak. Hnd., IX, No. 12, p. 33, 1871.	Quartz diorite.	Cf. A. G. Hög- bom, B. G. Inst. Ups., VI, p. 230, 1905. Not in W. T.

QUARTZ DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13 B4. V	64.02	20.45	2.85	n. d.	1.28	4.51	3.34	3.54	n. d.						99.59	
14 B3. IV	64.69	17.32	1.23	3.01	1.54	2.18	6.36	2.30	2.09		0.44	trace	trace		101.16	2.65
15 B3. IV	51.53	21.55	3.61	3.07	2.70	8.62	3.07	2.02	3.28	1.26	0.01				100.72	2.80
16 D3. V	57.57	16.61	1.19	4.82	5.25	2.94	4.25	1.02	4.40						98.05	2.8
17 C2. IV	66.56	15.67	0.39	3.98	0.59	3.51	4.82	1.72	0.64		0.51	0.18			98.67	
18 C2. IV	57.06	17.49	1.33	7.04	2.22	4.63	3.96	2.06	1.12		1.44	0.57	0.90		98.82	
19 D2. V	51.28	16.26	1.68	9.85	4.22	6.51	5.13	1.04	0.81		4.64	0.11	0.27		101.80	2.87
20 D3. V	65.73	16.20	2.66	1.68	1.28	3.12	4.12	1.89	1.47						98.15	
21 C3. V	56.45	20.15	4.36	5.00	2.66	6.59	2.95	1.00	1.61		trace	0.24	trace		101.01	
22 C4. V	62.22	23.29			3.22	6.21	2.69	1.27	0.14						99.04	
23 B4. V	56.61	15.55	12.66	n. d.	2.07	5.90	3.15	1.07	3.50						100.51	
24 C4. V	56.17	16.50	10.60	n. d.	2.21	6.97	2.94	0.75	3.01						99.15	
25 C4. V	55.69	14.20	11.52	n. d.	1.62	8.14	4.01	1.00	3.15						99.33	
26 B4. V	63.93	17.25	5.90	n. d.	2.03	4.74	2.93	3.29	0.80						100.87	
27 B4. V	62.95	17.61	4.59	n. d.	2.15	5.06	3.30	3.34	0.68						99.68	
28 B4. V	60.70	18.55	6.21	n. d.	2.56	5.10	2.54	3.70	1.18						100.54	
29 C2. IV	61.84	18.84	1.10	3.87	2.83	2.80	2.47	0.95	2.49	0.36	1.44	0.55	trace	FeS ₂ 0.49	100.03	2.68
30 C2. IV	60.34	24.65	0.27	4.42	1.46	2.47	4.40	1.34	0.30	0.21	0.18	0.24	0.06		100.34	
31 D3. V	55.10	16.19	4.30	5.30	6.50	9.33	3.00	1.49	0.84			1.01	trace		101.73	2.871
32 B3. IV	52.03	20.57	1.60	6.97	5.39	7.80	2.37	1.34	1.27						99.34	2.855

QUARTZ DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	Kockenhuss, Kullen, Sweden.	A. Hennig.	A. Hennig, Ref. N. J., I, p. 224, 1900.	Banatite.	In W. T., p. 407.
14	Ködelschutzteich, near Nordhalben, Thuringia.	R. Pöhlmann.	R. Pöhlmann, N. J. B. B., III, p. 86, 1885.	Quartz diorite porphyrite.	In W. T., p. 203.
15	Kofelspitzgrat, near Maul, Tyrol.	G. Hradil.	G. Hradil, Sb. Ak. W. Wien, CXXI, p. 873, 1912.	Tonalite.	
16	Timau, Carnic Alps, Veneto.	M. Gortani.	M. Gortani, Mem. Soc. Tosc., XXII p. 176, 1906.	Quartz porphyrite.	
17	Morignone, Valtellina, Lombardy.	A. Zapf.	A. Zapf, In. Diss. Jena, p. 27, 1910.	Tonalite.	
18	Near Ceppina, Valtellina, Lombardy.	A. Zapf.	A. Zapf, In. Diss. Jena, p. 19, 1910.	Quartz diorite.	
19	San Antonio,, Valtellina, Lombardy.	M. Dittrich.	W. Rasch, N. J. B. B., XXXII, p. 211, 1911.	Quartz diorite.	
20	Rino, Valcamonica, Piedmont.	C. Riva.	C. Riva, At. Soc. It. Mil., XXXVI, p. 141, 1896.	Quartz diorite.	In W. T., p. 407.
21	Ivrea, Piedmont.	L. v Wervecke.	F. R. van Horn, T. M. P. M., XVII, p. 407, 1898.	Quartz diorite.	In W. T., p. 407.
22	Kamary, near Balaclava, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int. VII, Guide XXXIII, p. 27, 1897.	Quartz diorite.	In W. T., p. 407.
23	Aiou Dag, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int. VII, Guide XXXIII, p. 27, 1897.	Quartz diorite.	In W. T., p. 407.
24	Tschamny Burun, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Quartz diorite.	In W. T., p. 407.
25	Buyuk Ouraga, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Quartz diorite.	In W. T., p. 409.
26	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 106, 1900.	Microtonalite.	In W. T., p. 409.
27	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 101, 1900.	Tonalite.	In W. T., p. 409.
28	Cap Marsa, Menerville Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 106, 1900.	Microtonalite.	In W. T., p. 409.
29	Zeia River, Amur District, Siberia.	W. Giers.	E. Ahnert, Reg. Aurif. Sib., X, Tab. VII, 1910.	Quartz diorite.	
30	Anabar River, Siberia.	H. Backlund.	H. Backlund, Trav. Mus. G. St. Pet., I, p. 128, 1907.	Quartz diorite.	
31	Siloenkang, Sumatra.	Reuter.	R. D. M. Verbeek, Sum. Westk., p. 232, 1883.	Quartz diorite.	Not in W. T.
32	Dargo, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XXIII, p. 141, 1887.	Quartz diorite.	In W. T., p. 293.

QUARTZ DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
33 D4. V	67.37	18.23	3.57	n. d.	2.71	trace	1.68	1.14	2.03	0.27		0.58		CO ₂ 8 none none	97.58	
34 A4. IV	60.21	12.28	13.84	n. d.	1.96	6.72	2.55	1.32	1.16						100.04	

DACITE.

1 D4. V	65.34	13.01	8.51	n. d.	0.53	6.30	5.14		1.17	trace					100.00	
2 B4. V	58.97	18.60	5.94	n. d.	6.89	2.84	3.05	2.24	1.35						99.88	
3 D4. V	66.85	14.08	3.06	n. d.	0.91	4.69	3.80	2.57	2.07						98.03	2.53
4 B4. V	69.54	12.68	4.01	n. d.	3.52	4.41	3.71	1.43			trace				99.30	
5 D3. V	66.03	14.57	2.57	1.19	1.89	3.38	3.71	2.70	2.07			0.09			98.20	
6 B3. IV	65.39	15.49	2.80	1.99	2.06	4.48	4.56	1.59	0.55			0.11			99.02	2.61
7 C4. V	68.32	19.61			1.95	4.24	4.06	1.45	0.54						100.17	2.765
8 B3. IV	63.73	17.17	4.06	0.61	1.29	2.65	4.53	2.11	0.83		2.48				99.46	2.67
9 B4. V	68.97	17.03	1.30	n. d.	0.79	3.26	5.15	1.70	1.10						99.30	
10 C3. V	65.29	20.15	5.57	1.13	0.16	2.11	2.52	1.24	1.19						99.36	
11 B3. IV	65.19	16.04	1.16	2.48	0.99	2.92	2.26	6.11	1.85						99.00	
12 B4. V	77.55	14.61	n. d.	2.21	0.32	2.12	1.43	1.62	n. d.			0.57	0.08		100.51	
13 B4. V	74.57	12.58	2.77	n. d.	0.30	0.35	3.98	3.70	1.04						99.29	2.604
14 C3. V	66.18	18.71	1.49	2.00	0.87	3.28	3.63	2.84	0.72						99.72	
15 D3. V	65.75	18.38	2.00	1.30	1.52	3.70	4.04	4.11	1.20				0.20		102.20	
16 C3. V	65.62	17.19	0.23	3.19	1.41	3.42	3.75	3.09	0.85						98.75	
17 D4. V	70.7	16.0	2.8	n. d.	0.2	1.1	5.0	1.5	0.9						98.2	

QUARTZ DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
33	Tallangalook, Victoria.	H. C. Jenkins.	H. C. Jenkins, A. R. Secy. Min. Vict., p. 39, 1902.	Quartz diorite.	
34	Waiaro, Moechau Range, New Zealand.	W. H. Baker.	J. Park, Tr. N. Z. Inst., XXXIII, p. 341, 1901.	Quartz diorite.	

DACITE.

1	China Bend, Columbia River, Washington.	R. W. Thatcher.	S. Shedd, Wash. G. S. A. R. II, p. 53, 1902.	Dacite tuff.	
2	Lassen Peak, California.	T. M. Chatard.	J. S. Diller, U. S. G. S. B. 148, p. 193, 1897.	Segregation in dacite.	In W. T., p. 419.
3	Seal Harbor, San Clemente Island, California.	W. S. T. Smith.	W. S. T. Smith, U. S. G. S. A. R. 18, II, p. 488, 1898.	Dacite.	In W. T., p. 417.
4	White Wall, St. Eustatius, West Indies.	G. A. F. Molengraaf.	G. A. F. Molengraaf, G. St. Eust., p. 47, 1886.	Dacite pumice.	H ₂ O=2.68. Not in W. T.
5	Hondon, Chiles Volcano, Colombia.	R. Kuch.	R. Kuch, G. Stud. Colomb., I, p. 179, 1892.	Dacite.	In W. T., p. 417.
6	Cumbal Volcano, Colombia.	R. Kuch.	R. Kuch, N. J., 1886, I, p. 40.	Dacite.	In W. T., p. 239.
7	Mojanda, near Quito, Ecuador.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 458, 1887.	Dacite.	In W. T., p. 417.
8	Chimborazo Volcano, Ecuador.	A. Lindner.	F. Tannhäuser in W. Reiss, Ecuador, II, p. 145, 1904.	Dacite.	
9	Cerros Blancos, San Juan, Argentina.	R. G. Teichgräber.	A. Stelzner, Btr. G. Argent., I, p. 184, 1885.	Dacite.	In W. T., p. 417.
10	Garbanzal, Cabo de Gata, Spain.	Hauff.	A. Osann, Z. D. G. G., XLIII, p. 706, 1891.	Dacite.	In W. T., p. 417.
11	Tolfa, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 49, 1897.	Toscanite.	In W. T., p. 159.
12	Eruption of 1889, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Giorn. Min., III, p. 107, 1892.	Quartz andesite (dacite).	In W. T., p. 123.
13	Kamary, near Sebastopol, Crimea.	A. Lagorio.	A. Lagorio, T. M. P. M., VII, p. 448, 1887.	Dacite.	In W. T., p. 153.
14	Kalko, near Blo, Caucasus.	Makerow.	Loewinson-Lessing, Ref. N. J., II, p. 237, 1899.	Dacite.	In W. T., p. 193.
15	Mount Elbruz, Caucasus.	A. Dannenberg.	A. Dannenberg, T. M. P. M., XIX, p. 233, 1900.	Dacite.	In W. T., p. 417.
16	Chrety, Kasbek, Caucasus.	Loewinson-Lessing.	Loewinson-Lessing, Mat. Geol. Rus., XXI, p. 107, 1901.	Dacite.	
17	Kurt Boghaz, Galatia, Asia Minor.	Schaefer and Herz.	L. Milch, N. J. B. B., XVI, p. 115, 1903.	Dacite.	

DACITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
18 C4. V	63.50	18.80	4.72	n. d.	1.80	3.54	3.95	4.45	0.60						101.36	
19 B3. IV	61.29	17.68	6.03	0.30	2.45	5.61	4.28	1.38	0.96		0.65				100.63	2.440
20 C4. V	68.47	14.67	3.93	n. d.	0.32	3.89	2.34	3.42	2.59					(8 2.32)	100.63	
21 C4. V	67.47	19.07	1.05	n. d.	0.24	4.87	3.87	3.89	0.84						101.30	
22 C4. V	63.00	17.40	5.03	n. d.	1.02	5.71	3.89	4.81	0.48						101.34	
23 D4. V	67.71	17.25	4.21	n. d.	1.43	4.38	3.13	2.90	1.35						102.36	
24 B4. V	59.24	18.45	4.58	n. d.	2.06	6.08	3.15	3.22	3.66						100.44	
25 B4. V	58.29	23.66			1.93	6.75	1.59	2.32	5.63						100.17	
26 C3. V	69.64	16.16	1.39	2.74	0.59	4.33	4.64	0.50	1.64						101.63	
27 B3. IV	64.54	16.24	5.88	0.11	1.17	5.17	3.71	1.05	1.99		0.53				100.39	2.60
28 B4. V	64.38	13.62	9.17	n. d.	2.18	1.99	6.28	3.51	n. d.						101.13	

SYENITE.

1 B4. V	72.20	12.50	n. d.	3.70	n. d.	0.90	5.30	3.88	0.60						99.08	2.62
2 C2. IV	61.93	13.03	0.56	8.00	1.76	4.02	3.18	2.80	1.95		0.84	0.32	0.18		98.76	2.757
3 D3. V	61.65	18.91	2.37	1.48	1.11	2.10	5.59	4.20	0.60						98.01	
4 B3. IV	58.60	19.94	4.25	2.42	1.71	2.76	3.24	4.84	2.29						100.05	
5 B4. V	60.30	25.70	none	none	0.15	5.33	4.28	3.80	n. d.		0.25				99.81	
6 B4. V	62.96	13.45	3.54	n. d.	0.61	1.28	5.46	5.19	2.77				5.29		100.55	
7 C4. V	59.48	13.46	6.71	n. d.	1.64	1.83	11.67	6.03	0.20		0.17				101.19	
8 B4. V	54.15	18.92	6.79	n. d.	1.90	3.72	5.47	8.44						Cl 0.42	99.81	

DACITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
18	Mount Phako, Lemnos Island, Aegean Sea.	L. de Launay.	L. de Launay, An. Min. (9), XIII, p. 223, 1898.	Dacite.	Not in W. T.
19	Anzeiou, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Dacite.	In W. T., p. 243.
20	Cap Blanc, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 59, 1900.	Dacite.	In W. T., p. 417.
21	Cap Blanc, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 59, 1900.	Dacite.	In W. T., p. 419.
22	Cap Blanc, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 59, 1900.	Dacite.	In W. T., p. 419.
23	Dra Zeg Etter, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 129, 1900.	Dacite.	In W. T., p. 419.
24	Dra Zeg Etter, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 129, 1900.	Dacite.	In W. T., p. 419.
25	Dra Zeg Etter, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 129, 1900.	Dacite.	In W. T., p. 419.
26	Zaimokuiwa, Kunashiri, Chinshima, Japan.	Takaminé.	Pr. C. Soc. Jap., 1885.	Dacite.	Not in W. T.
27	Sapeh, Sumbawa, Island.	Tillmans.	G. Rack, N. J. B. B., XXXIV, p. 47, 1912.	Dacite.	
28	Willinigongong, Victoria.	R. J. Lewis.	J. W. Gregory, Pr. R. Soc. Vict., XIV, p. 201, 1902.	Geburite-dacite.	

SYENITE.

1	Greenville, Quebec.	O. E. Le Roy.	O. E. Le Roy, B. G. S. A., XII, p. 392, 1901.	Quartz syenite porphyry.	
2	Onaping, Sudbury, Ontario.	E. G. A. Ardagh.	A. P. Coleman, J. G., XV, p. 770, 1907.	Syenite?	
3	Swastika Area, Ontario.	Not stated.	E. L. Bruce, Rep. Bur. Min. Ont., XXI (1), p. 260, 1912.	Syenite porphyry.	
4	Red Sucker, Port Coldwell, Ontario.	Not stated.	H. L. Kerr, Rep. Bur. Min. Ont., XIX (1), p. 222, 1910.	Quartz syenite.	
5	Roseland, Nelson County, Virginia.	F. P. Dunnington.	Watson and Taber, Va. G. S. B. III A, p. 76, 1913.	Syenite.	
6	Fourche Mountain, Little Rock, Arkansas.	R. N. Brackett.	J. F. Williams, Ign. R. Ark., p. 99, 1891.	Quartz syenite.	MnO high. In W. T., p. 389.
7	Sawtooth Mountains, Trans-Pecos, Texas.	Not stated.	A. Osann, T. M. P. M., XV, p. 428, 1895.	Syenite.	Al ₂ O ₃ low, alkalies high. In W. T., p. 389.
8	South Boulder Creek, Montana.	G. P. Merrill.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 672, 1895.	Syenite.	In W. T., p. 389.

SYENITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	Puy St. André, Pelvoux, Dauphiny, France.	Rüst?	P. Termier, B. Soc. G. Fr., XXVII, p. 408, 1899.	Microsyenite.	Not in W. T.
10	Rochail, Lake Lawvitel, France.	Not stated.	P. Termier, C. R., CXXIV, p. 319, 1897.	Mica syenite.	Inclusion in granite. In W. T., p. 389.
11	Capoalla Cuculla, Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 114, p. 44, 1906.	Riebeckite-quartz syenite.	
12	Turo del Pardals, Barcelona, Spain.	Maier.	Maier, Ber. Nf. Ges. Freib., XVII, 1908.	Syenite porphyry.	Altered.
13	Tonsenas, near Christiania, Norway.	P. Jannasch.	O. Lang, Myt Mag., XXX, p. 40, 1886.	Syenite (nordmarkite).	In W. T., p. 195.
14	Thinghould, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Akerite.	In W. T., p. 167.
15	Vettakollen, near Christiania, Norway.	P. Jannasch.	O. Lang, Myt Mag., XXX, p. 40, 1886.	Syenite (akerite, W. C. Brögger).	In W. T., p. 263.
16	Farrisvand, Laurvik, Norway.	Stahl and Mansfeld.	A. Merian, N. J. B. B., III, p. 266, 1885.	Augite syenite.	Alkalies uncertain. Cf. ref. In W. T., p. 203.
17	Ramnäs, Norway.	R. Mauzelius.	W. C. Brögger, Z. K., XVI, p. 46, 1890.	Akerite.	In W. T., p. 263.
18	Hedrum, near Sandefjord, Norway.	G. Pajkull.	W. C. Brögger, Z. K., XVI, p. 31, 1890.	Mica syenite.	In W. T., p. 295.
19	Ullernas, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 49, 1890.	Akerite.	"
20	Michelsberg, Katzenbuckel, Odenwald.	W. Freudenberg.	W. Freudenberg, Mt. Bad. G. L.-A., V, p. 329, 1907.	Aplitic shonkinite.	Altered?
21	Lindenberg, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kt. Hes., Bl Rossdorf, p. 54, 1886.	Syenite.	Border of granite dike. In W. T., p. 265.
22	Rothschönberg, Deutschenbroda, Saxony.	Fritsch and Venator.	J. M. C. Henderson, Z. D. G. G., XLVII, p. 539, 1895.	Mica syenite.	In W. T., p. 389.
23	Grube, Brocken, Harz.	Lorenz.	O. H. Erdmannsdoerfer, Jb. Pr. G. L.-A., XXVII, p. 354, 1906.	Syenite.	Sum incorrect.
24	Winterbach, near St. Wendel, Harz.	Fischer.	K. A. Lossen, Jb. Pr. G. L.-A., X, p. 266, 1892.	Syenite porphyry.	In W. T., p. 251.
25	Wolynkathal, Böhmerwald, Bohemia.	J. Máhlbauer.	J. N. and J. Woldrich, Arch. Landdf. Böh., XII (4), p. 65, 1904.	Syenite porphyry.	
26	Ditro, Siebenbürgen, Hungary.	J. v. Szadeczky.	J. v. Szadeczky, Ref. N. J., I, p. 402, 1901.	Nordmarkite.	In W. T., p. 391.
27	Ditro, Siebenbürgen, Hungary.	Not stated.	V. C. Butureau, B. Soc. Sc. Buk., p. 278, 1897.	Syenite.	In W. T., p. 391.
28	Boscampo, Predazzo, Tyrol.	J. A. Ippen.	J. A. Ippen, N. J. Cb., p. 640, 1903.	Quartz syenite porphyry.	

SYENITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
29 C?2. IV	53.30	21.30	1.40	2.92	0.90	6.30	5.83	8.17	0.75		0.50	trace		Cl 0.03	101.40 (100.46)	
30 B4. V	54.43	20.57	4.52	n. d.	3.47	5.89	5.30	4.98	0.69						99.85	
31 C3. V	66.5	18.9	3.6	1.3	0.4	0.2	4.8	4.5	0.9						101.1	2.65
32 B?2. III?	39.88	20.33	5.24	7.60	6.48	11.51	4.64	2.44	0.95		0.95	6.43			100.45 (99.70)	
33 D4. V	72.0	7.0	7.14	n. d.	n. d.	n. d.	8.0	2.0	2.0				trace		98.14	
34 D4. V	66.0	12.0	2.9	n. d.	n. d.	n. d.	5.0	10.0	2.5					CaF ₂ 0.9	99.3	
35 C3. V	58.77	17.62	3.40	2.37	1.76	1.28	7.69	4.19	0.42		1.11		0.12		98.73	2.69

PORPHYRY.

1 B3. IV	56.25	18.42	1.56	2.41	2.38	6.13	8.10	0.32	0.22					CO ₂ 8	4.58 0.10	100.47	
2 B4. V	75.80	13.80	0.68	n. d.	0.86	n. d.	1.52	4.82	1.74							99.22	
3 B4. V	69.20	16.62	2.85	n. d.	1.52	n. d.	1.25	6.38	2.90							100.72	
4 C4. V	63.4	17.9	8.4	n. d.	1.4	1.02	3.96	4.2	0.72				trace			101.00	
5 C4. V	62.3	15.7	6.7	n. d.	3.1	2.1	3.77	4.21	1.3							99.18	
6 B4. V	62.3	14.1	8.2	n. d.	3.4	1.3	4.4	3.5	2.2				trace			99.4	
7 B4. V	62.06	13.7	8.9	n. d.	1.4	1.05	5.19	6.0	1.41				trace			99.71	
8 B4. V	61.07	11.8	13.1	n. d.	1.9	1.99	2.8	5.5	1.6				trace			99.76	
9 C4. V	59.5	11.8	13.1	n. d.	2.7	2.2	3.96	4.32	1.55				trace			99.13	
10 D4. V	59.50	18.49	6.38	n. d.	2.15	5.65	4.19	1.69	3.57			0.35				101.97	
11 B4. V	54.0	18.9	7.8	n. d.	0.7	3.8	6.5	3.9	2.3				0.4			100.3	
12 D4. V	67.40	15.62	3.15	n. d.	0.56	1.87	2.51	7.10	0.50							98.71	

SYENITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
29	Monte Somnia, near Naples, Italy.	Pisani.	A. Lacroix, N. Arch. Mus. (4), IX, p. 146, 1907.	Microsyenite.	Sum incorrect.
30	Mount Vitosa, near Sofia, Bulgaria.	L. Dimitrow.	L. Dimitrow, Ds. Ak. W. Wien, LX, p. 493, 1893.	Pyroxene syenite.	In W. T., p. 391.
31	Karsa, French Somali.	H. Arsандаux.	H. Arsандаux, C. R., CXXXVII, p. 878, 1903.	Microsyenite.	
32	Topsail Point, Tamara Island, Los Islands, French Guinea.	Lassieur.	A. Lacroix, N. Arch. Mus., III, p. 76, 1911.	Microshonkinite.	Sum incorrect.
33	Nooitgedacht, Pilandsberg, Transvaal.	G. S. Laboratory.	W. A. Humphrey, Un. S. Afr. G. S. A. R. (1911), p. 83, 1912.	Syenite.	
34	Rhenosterspruit, Pilandsberg, Transvaal.	G. S. Laboratory.	W. A. Humphrey, Un. S. Afr. G. S. A. R. (1911), p. 83, 1912.	Syenite.	
35	Rudikovka River, Jenissei District, Siberia.	A. Semenchenko.	A. Meister, Reg. Aurif. Sib., IX, p. 223, 1910.	Umptekite.	

PORPHYRY.

1	Swastika, Ontario.	E. L. Bruce.	E. L. Bruce, Sch. Min. Q., XXXV, p. 162, 1914.	Porphyry.	Not fresh.
2	Villetelle, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 76, 1902.	Porphyry.	
3	Villetelle, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Porphyry.	
4	Chateau Noir, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Sv. Ct. G. Fr., VI, No. 40, p. 48, 1894.	Orthophyre.	In W. T., p. 391.
5	Lac du Cerisier, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Sv. Ct. G. Fr., VI, No. 40, p. 49, 1894.	Orthophyre.	In W. T., p. 391.
6	Glacier St. Sorlin, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Sv. Ct. G. Fr., VI, No. 40, p. 48, 1894.	Orthophyre.	In W. T., p. 391.
7	Chateau Noir, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Sv. Ct. G. Fr., VI, No. 40, p. 49, 1894.	Orthophyre.	In W. T., p. 391.
8	Frenay, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Sv. Ct. G. Fr., VI, No. 40, p. 49, 1894.	Orthophyre.	In W. T., p. 391.
9	Chateau Noir, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Sv. Ct. G. Fr., VI, No. 40, p. 49, 1894.	Orthophyre.	In W. T., p. 391.
10	Dramont, Esterel, France.	Pisani.	A. Michel-Levy, B. Sv. Ct. G. Fr., XXI, No. 130, p. 41, 1912.	Porphyry.	
11	Brumun, Hedemark, Norway.	H. Bäckström.	H. Bäckström, Sv. Vet. Ak. Hndl., XVI (II), No. 3, p. 11, 1888.	Rhomben porphyry.	In W. T., p. 391.
12	Varvnejärvi, Teisko, Finland.	H. Berghell.	J. J. Sederholm, B. C. G. Fin., No. 6, p. 68, 1897.	Orthoclase porphyry.	In W. T., p. 391.

PORPHYRY—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
13 C3. V	66.42	16.76	1.22	0.62	0.37	0.32	1.26	12.55	1.05		0.05	trace		CO ₂ 0.03	101.56	2.56
14 D4. V	65.77	23.51	1.95	n. d.	0.63	trace	1.44	3.72	3.35						100.37	
15 C3. V	59.75	16.98	10.44	0.54	0.65	1.05	3.34	7.32	1.61		trace				101.68	2.71
16 C4. V	52.10	17.68	10.43	n. d.	2.46	5.72	3.84	4.61	3.57		0.92	trace	trace		101.33	2.698
17 B4. V	58.24	14.26	n. d.	8.75	1.59	3.68	3.22	3.60	2.87			2.62			100.03	
18 B4. V	56.98	19.01	n. d.	9.75	0.99	3.60	3.58	3.91	1.31			1.71	trace		100.84	
19 C3. V	62.37	21.26	3.57	6.45	0.38	0.55	1.22	2.62	0.11				0.11		99.64	
20 B3. IV	48.49	19.92	3.85	6.05	4.35	9.25	2.51	2.69	1.99						99.10	
21 B3. IV	74.80	12.60	1.53	0.83	0.17	0.79	2.54	4.83	1.08						99.17	
22 B3. IV	66.26	20.54	1.16	2.05	1.33	0.44	1.95	4.93	1.20	0.08	0.33				100.32	
23 C4. V	76.40	12.00	1.25	n. d.	0.75	0.25	2.00	4.00	2.25						98.90	
24 B4. V	55.60	18.20	9.40	n. d.	3.78	6.87	2.53	0.45	2.62				1.13		100.58	
25 B4. V	54.12	19.75	10.29	n. d.	2.07	8.86	2.93	0.24	1.48				0.26		100.50	
26 C3. V	68.12	15.97	1.09	2.27	0.92	0.71	6.03	1.29	0.29	0.17	0.62	trace		CO ₂ 1.13 S trace	98.61	

TRACHYTE.

1 B4. V	53.40	20.82	3.92	n. d.	1.53	7.05	3.79	2.97	6.57						100.05	
2 B4. V	67.16	14.53	4.17	n. d.	0.41	1.26	5.55	6.10	1.10						100.28	
3 A4. IV	65.76	17.18			trace	2.30	2.22	3.14	5.60	3.46					99.66	
4 A4. IV	65.56	18.24			0.72	2.58	2.08	3.94	6.50	1.12					100.74	
5 B4. IV	61.82	19.86			0.51	1.78	2.38	1.31	11.47						99.13	

PORPHYRY—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
13	Rüdesheim, Rheinland.	K. Hampe.	K. A. Lossen, Jb. Pr. G. L.-A., V, p. 534, 1885.	Porphyry.	Metamor- phosed. In W. T., p. 393.
14	Bilsburg, Eder River, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 568, 1893.	Porphyry.	In W. T., p. 393.
15	Zimmerberg, near Friedrichroda, Thuringia.	A. Mühlenberg.	A. Mühlenberg, In. Diss. Halle, p. 42, 1908.	Orthoclase porphyry.	
16	Linsenkopf, Thuringia.	A. Mühlenberg.	A. Mühlenberg, In. Diss. Halle, p. 51, 1908.	Orthophyre.	
17	Weinberg, Upper Lausitz.	V. Steger.	V. Steger, Ref., N. J., I, p. 42, 1887.	Porphyry.	In W. T., p. 393.
18	Weinberg, Upper Lausitz.	V. Steger.	V. Steger, Ref. N. J., I, p. 42, 1887.	Porphyry.	In W. T., p. 393.
19	Nadabula, Erzgebirge, Hungary.	E. Ernyei.	F. Schafarzik, Math. Nh. Ber. Ung., XXIII, p. 240, 1905.	Porphyroid.	Other analyses in same paper.
20	Monte Inverno, Monzoni, Tyrol.	C. Doelter.	C. Doelter, Anz. Ak. W. Wien, XXXIX, p. 231, 1902.	Segregation in syenite porphyry.	
21	Käserngrat, Windgälle Mountains, Switzerland.	J. Mai.	C. Schmidt, N. J. B. B., IV, p. 432, 1886.	Porphyry.	In W. T., p. 135.
22	Bavugls, Suretta Massif, Switzerland.	N. Sahlbom.	H. Meyer, In. Diss. Freib., p. 14, 1909.	Porphyry.	
23	Gravesano, Lake Lugano, Ticino.	A. Schwagor.	K. v. Gümbel, Geog. Jhrt., VII, p. 71, 1894.	Porphyry.	Not in W. T.
24	Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek, p. 55.	Orthophyre.	
25	Fedora Bay, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek, p. 55.	Orthophyre.	
26	Boulder, Kalgoorlie, Western Australia.	E. S. Simpson.	E. S. Simpson, W. Aust. G. S. B. 6, p. 73, 1902.	Porphyry.	

TRACHYTE.

1	Shelburne Point, Burlington. Vermont.	Morrison.	Kemp and Marsters, U. S. G. S. B. 107, p. 20, 1893.	Bostonite.	Metamorphosed. In W. T., p. 393.
2	Indian Point, Chateaugay Lake, Clinton County, New York.	A. S. Eakle.	A. S. Eakle, Am. G., XII, p. 34, 1893.	Bostonite.	In W. T., p. 393.
3	Devils Pathway, Montana.	J. E. Whitfield.	G. P. Merrill, A. J. S., XXXII, p. 202, 1886.	Trachyte-obsidian dust.	In W. T., p. 397.
4	Little Sage Creek, Montana.	J. E. Whitfield.	G. P. Merrill, A. J. S., XXXII, p. 202, 1886.	Trachyte-obsidian dust.	In W. T., p. 397.
5	Bozeman, Montana.	F. W. Clarke.	A. C. Peale, U. S. G. S. B. 148, p. 141, 1897.	Trachyte dust.	In W. T., p. 397.

TRACHYTE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
6	Fort Ellis, Montana.	F. W. Clarke.	A. C. Peale, U. S. G. S. B. 148, p. 141, 1897.	Trachyte dust.	In W. T., p. 397.
7	Marsh Creek Valley, Idaho.	J. E. Whitfield.	G. P. Merrill, A. J. S., XXXII, p. 202, 1886.	Trachyte-obsidian dust.	In W. T., p. 397.
8	St. Matthew Island, Alaska.	R. M. Chapin.	B. K. Emerson, Harriman Alaska Exp., IV, p. 35, 1904.	Trachyte.	
9	Clipperton Island, Atlantic Ocean.	J. J. H. Teall.	J. J. H. Teall, Q. J. G. S., LIV, p. 230, 1898.	Trachyte.	Phosphatized. Not in W. T.
10	Puente del Inca, Cordillera Mendoza, Argentina.	R. Müller.	A. Stelzner, Btr. G. Argent., I, p. 183, 1885.	Trachyte.	In W. T., p. 397.
11	Arenig, Wales.	J. H. Player.	J. J. H. Teall, Brit. Petrog., p. 339, 1889.	Orthofelsite.	In W. T., p. 135.
12	Newtown head, County Waterford, Ireland.	Jones and Robinson.	F. R. C. Reed, Q. J. G. S., LVI, p. 686, 1900.	Trachyte.	In W. T., p. 397.
13	Begon, near Entrammes, Laval Basin, France.	L. Bertraud.	A. Michel-Levy, C. R., CXXII, p. 265, 1896.	Albitophyre.	In W. T., p. 391.
14	La Bourboule, Mont Dore, Auvergne.	Pisani.	Michel-Levy and Lacroix, C. R., CXLVIII, p. 1721, 1909.	Bostonite.	
15	Route de Guéry, Mont Dore, Auvergne.	Lassieur.	Michel-Levy and Lacroix, C. R., CLII, p. 1202, 1911.	Trachyte pumice.	
16	La Quenille, Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Trachyte.	In W. T., p. 397.
17	Mont Griounot, Cantal, France.	Pisani.	A. Lacroix, C. R., CXLV, p. 496, 1907.	Trachyte.	
18	Mont Griounot, Cantal, France.	Pisani.	A. Lacroix, C. R., CXLV, p. 496, 1907.	Bostonite.	
19	Ferrera, Columbretes Islands, Spain.	R. Pfohl.	F. Becke, T. M. P. M., XVI, p. 173, 1896.	Inclosure in trachyte.	In W. T., p. 299.
20	Brohlthal, Laacher See, Rheinland.	W. Bruhus.	W. Bruhus, Ref., N. J., II, p. 418, 1892.	Trachyte pumice.	In W. T., p. 397.
21	Laacher See, Rheinland.	W. Bruhus.	W. Bruhus, Ref., N. J., II, p. 418, 1892.	Trachyte pumice.	In W. T., p. 397.
22	Laacher See, Rheinland.	W. Bruhus.	W. Bruhus, Ref. N. J., II, p. 418, 1892.	Trachyte.	In W. T., p. 215.
23	Dachberg, Rhönggebirge.	Knoevenagel.	F. Rinne, Jb. Pr. G. L.-A., VII, p. 20, 1887.	Soda trachyte.	In W. T., p. 397.
24	Dachberg, Rhönggebirge.	Deicke.	F. Rinne, Jb. Pr. G. L.-A., VII, p. 21, 1887.	Soda trachyte.	In W. T., p. 397.
25	Schiffenberg, Giessen, Hesse.	F. Roth.	F. Roth, In. Diss. Gies., 1892.	Trachyte pumice.	In W. T., p. 399.

TRACHYTE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
26 C3. V	64.47	20.30	3.57	0.91	0.30	2.23	3.34	4.21	1.74						101.07	2.54
27 B4. V	61.39	20.98	4.15	n. d.	trace.	1.87	3.36	4.67	3.65						100.63	2.48
28 B4. V	70.59	13.08	4.84	n. d.	0.16	1.77	3.09	2.95	3.15			trace			99.63	
29 C4. V	62.74	22.30	1.22	n. d.	trace	0.71	2.60	2.73	8.16						100.46	
30 B4. V	60.70	19.70	9.20	n. d.	1.20	1.92	2.40	4.53	0.99			trace			100.64	
31 B4. V	60.17	17.40	10.20	n. d.	trace	3.55	4.20	4.64	0.43			trace			100.59	2.666
32 B4. V	59.80	18.30	7.10	n. d.	trace	4.30	4.47	3.50	1.85			trace			99.32	2.509
33 C4. V	58.20	21.40	8.60	n. d.	trace	4.50	6.22		1.42			trace			100.34	
34 B4. V	55.80	20.00	10.80	n. d.	trace	5.22	3.00	5.20	0.58			trace			100.60	
35 B3. IV	57.51	20.37	4.13	1.32	1.99	2.69	2.88	3.38	5.06		0.99				100.32	
36 B4. V	67.30	20.75			1.05	2.63	2.75	4.60	0.34						99.42	2.541
37 B4. V	65.79	16.58	5.18	n. d.	0.98	3.05	2.34	4.63	1.83						100.37	
38 B3. IV	63.26	16.05	1.04	6.13	1.29	5.50	1.62	3.18	1.57			0.51	0.14		100.29	2.416
39 B3. IV	63.22	16.26	1.41	3.84	1.25	4.75	2.42	4.18	1.87			1.07	trace		100.27	2.481
40 D4. V	59.36	27.27	n. d.	3.16	n. d.	3.99	1.11	1.65	3.38				0.14		100.06	
41 B3. IV	57.97	17.65	0.63	7.50	1.71	5.53	1.50	5.31	1.82			0.42	0.09		100.13	2.451
42 B3. IV	61.49	17.02	5.15	2.86	2.62	6.18	0.85	4.09	0.10						100.36	2.66
43 B3. IV	58.78	16.97	1.13	2.10	1.46	7.27	3.67	4.18	3.60			0.32	0.17	SO ₂ Cl 0.44 trace	100.09	
44 B3. IV	55.44	18.60	2.09	4.48	4.75	6.76	1.79	6.63	0.25		0.16	trace			100.75	2.700

TRACHYTE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
26	Auerbach, Nördlingen, Ries, Bohemia.	E. Schowalter.	E. Schowalter, In. Diss., Erl., p. 16, 1904.	Trachyte.	
27	Polsing, Nördlingen, Ries, Bohemia.	E. Schowalter.	E. Schowalter, In. Diss. Erl., p. 31, 1904.	Trachyte.	
28	Kaprioriskathal, Bulza, Krasso, Hungary.	K. Roka.	E. Pinkert, F. K., XXXVII, p. 299, 1907.	Trachyte.	
29	Karcsava, Hungary.	C. v. John.	v. John and Eichleiter, Jb. G. R.-A. Wien, L, p. 689, 1901.	Trachyte.	
30	Fintaer Straz, Eperies Mountains, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 533, 1884.	Trachyte.	In W. T., p. 399.
31	Krivi Javor, Eperies Mountains, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 540, 1884.	Trachyte.	In W. T., p. 399.
32	Klauzura, Eperies Mountains, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 544, 1884.	Trachyte.	In W. T., p. 399.
33	Josefstollen, Dubnik, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 547, 1884.	Trachyte.	In W. T., p. 399.
34	Sosujfalu, Eperies Mountains, Hungary.	Steiner.	S. Roth, F. K., XIV, p. 541, 1884.	Trachyte.	In W. T., p. 399.
35	Repistye, Hungary.	Z. Weyberg.	Z. Weyberg, Ref., N. J., I, p. 398, 1912.	Trachyte.	
36	Monte Amiata, Italy.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 458, 1887.	Trachyte.	In W. T., p. 399.
37	Monte Amiata, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. It., XVIII, p. (6), 1888.	Trachyte.	In W. T., p. 185.
38	San Lorenzo, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, N. J. B. B., VI, p. 3, 1889.	Olivine trachyte.	In W. T., p. 399.
39	Torre Alfina, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, N. J. B. B., VI, p. 3, 1889.	Olivine trachyte.	In W. T., p. 399.
40	Valle Vidona, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, N. J. B. B., VI, p. 13, 1889.	Trachyte tuff.	In W. T., p. 399.
41	Bolsena, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, N. J. B. B., VI, p. 8, 1889.	Trachyte.	In W. T., p. 399.
42	Soriano, Cinino Volcano, near Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Labroligoclasite (vulsinite).	
43	Bagnaia, near Viterbo, Italy.	L. Ricciardi.	L. Ricciardi, Gazz. Chim. It., XVIII, 1888.	Trachyte.	In W. T., p. 271.
44	Fontana Fiescoli, near Viterbo, Italy.	H. S. Washington.	H. S. Washington, J. G., IV, p. 837, 1896.	Ciminite.	Al ₂ O ₃ high, MgO low. Cf. No. 8, II.5.2.2. In W. T., p. 399.

TRACHYTE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
45 B4. V	62.50	18.44	3.88	n. d.	0.47	0.83	7.17	4.98	n. d.					Cl 0.22	99.49	
46 B4. V	61.55	19.06	4.14	n. d.	0.62	1.28	6.72	5.31	n. d.						99.78	
47 C4. V	59.65	17.82	4.46	n. d.	0.61	2.35	5.95	7.29	n. d.					Cl 0.88	99.01	
48 D4. V	57.68	22.15	4.74	n. d.	1.42		2.04	12.06	n. d.			0.12	trace	Cl 0.85	101.06	2.613
49 D4. V	59.38	18.40	4.33	n. d.	0.57	2.24	5.42	6.68	0.24		trace		0.38	Cl 0.84	98.48	
50 D4. V	58.18	18.29	4.63	n. d.	0.68	2.47	5.27	6.93	n. d.		0.25		0.27	Cl 0.89	97.87	
51 C2. IV	57.91	15.79	6.81	0.01	1.66	2.99	6.01	7.27	0.34		0.65	0.01	0.23	Cl 0.61	100.29	2.516
52 D4. V	59.47	18.65	4.50	n. d.	0.59	2.62	4.79	7.12	0.81				0.20	Cl 0.17	98.92	
53 D4. V	59.34	18.48	4.59	n. d.	0.77	2.54	5.12	6.75	n. d.		0.19		0.31	Cl 0.81	98.90	
54 D4. V	59.17	18.65	4.50	n. d.	0.59	2.62	4.82	7.12	0.81				0.20	Cl 0.17	98.65	
55 C4. V	59.12	18.25	12.00	n. d.	0.46	2.35	1.96	3.47	3.45						101.06	
56 D3. V	57.25	19.93	4.83	2.27	1.78	3.40	4.43	6.96	0.49			trace	0.09	Cl 0.29	101.72	
57 C4. V	60.76	20.08	4.46	n. d.	trace	2.07	5.70	6.31	1.37					Cl trace	100.75	
58 B4. V	59.48	16.87	8.55	n. d.	2.30	5.29	3.79	3.85							100.13	
59 D4. V	71.5		16.9		0.3	1.2	6.5	2.8							99.6	
60 C4. V	60.2	10.0	11.9	n. d.	2.9	6.1	6.0	3.1							100.2	
61 D4. V	64.46	21.09	n. d.	n. d.	0.60	11.07	0.72	0.32							98.57	
62 C4. V	61.49	20.82	5.03	n. d.	0.51	1.98	3.10	7.03				0.03	0.01		100.00	
63 B4. V	68.00	18.50	2.44	n. d.	trace	0.71	4.28	4.80	1.40						100.13	
64 B4. V	66.00	17.30	2.31	n. d.	0.60	0.71	2.22	5.17	6.20						100.61	

TRACHYTE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
45	Vomero, Naples, Italy.	G. Freda.	C. de Stefani, Pet. Mt. Ergh., CLVI, p. 162, 1907.	Piperno (trachyte).	
46	Vomero, Naples, Italy.	G. Freda.	C. de Stefani, Pet. Mt. Ergh., CLVI, p. 162, 1907.	Piperno (trachyte).	
47	St. Elmo, Naples, Italy.	G. Freda.	G. Freda, Rend. Ac. Nap., III, 1889.	Trachyte.	In W. T., p. 399.
48	St. Elmo, Naples, Italy.	L. dell'Erba.	L. dell'Erba, Rend. Ac. Sc. Nap., IV (2), p. 6, 1890.	Sanidinite (trachyte).	In W. T., p. 399.
49	Monte Santo, Naples, Italy.	G. Freda.	G. Freda, Rend. Ac. Sc. Nap., III, 1889.	Trachyte.	In W. T., p. 399.
50	Monte Santo, Naples, Italy.	G. Freda.	G. Freda, Rend. Ac. Sc. Nap., III, 1889.	Trachyte.	In W. T., p. 399.
51	Monte Santo, Naples, Italy.	H. J. Johnston- Lavis.	H. J. Johnston-Lavis, G. Mag. (III), VI, p. 77, 1889.	Trachyte.	In W. T., p. 251.
52	Piazzo Amedeo, Naples, Italy.	G. Freda.	C. de Stefani, Pet. Mt. Ergh., CLVI, p. 162, 1907.	Piperno (trachyte).	
53	Rione Amedeo, Naples, Italy.	G. Freda.	G. Freda, Rend. Ac. Sc. Nap., III, 1889.	Trachyte.	In W. T., p. 399.
54	Rione Amedeo, Naples, Italy.	G. Freda.	G. Freda, Rend. Ac. Sc. Nap., III, 1889.	Trachyte.	In W. T., p. 399.
55	Monte Rotaro, Ischia, near Naples, Italy.	F. Angel.	F. Angel, N. J. B. B., XXX, p. 457, 1910.	Trachyte pitchstone.	Cf. No. 26, I.5.1.3.
56	Concola, Fondo Riccio, Phlegrean Fields, Italy.	E. Manasse.	C. de Stefani, Pet. Mt. Ergh., CLVI, p. 162, 1907.	Trachyte.	Lapilli.
57	Punta di Ricciola, Procida Island, Bay of Naples, Italy.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 475, 1887.	Trachyte obsidian.	In W. T., p. 399.
58	Grotta dei Palizzi, Vulcano, Aeolian Islands.	Heidepriem.	A. Bergeat, Abh. Bay. Ak. W., XX, p. 166, 1899.	Olivine trachyte.	In W. T., p. 401.
59	Capo Rosso, San Pietro, Sardinia.	S. Bertolio.	S. Bertolio, B. C., G. It., XXV, p. 418, 1894.	Trachyte.	In W. T., p. 401.
60	Acqua Fredda, Siliqua, Sardinia.	S. Bertolio.	S. Bertolio, B. Soc. G. Fr. (3), XXIII, p. 454, 1895.	Trachyte.	In W. T., p. 401.
61	Angara River, Nijni Tagilsk, Perm, Russia.	D. Beljankin.	L. Lessing, Vh. Rus. M. Ges., XLIII, p. 562, 1905.	Albitite.	
62	Golabara River, Serbia.	A. B. Griffiths.	A. B. Griffiths, Q. J. G. S., XLII, p. 566, 1886.	Trachyte.	In W. T., p. 401.
63	Hagia Paraskevi, Mytilene, Aegean Sea.	L. de Launay.	L. de Launay, Ann. d. Mines (9), XIII, p. 187, 1898.	Rhyolitic trachyte.	Not in W. T.
64	Pyrrha, Mytilene, Aegean Sea.	L. de Launay.	L. de Launay, Ann. d. Mines (9), XIII, p. 187, 1898.	Obsidian.	Not in W. T.

TRACHYTE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
65 B3. IV	70.27	10.59	2.34	0.09	0.51	2.94	1.79	1.70	5.70	4.01		0.04	0.01		100.00	
66 B3. IV	64.70	14.19	3.38	0.35	3.03	5.49	4.38	1.89	2.57			0.02			100.00	
67 B4. V	63.30	19.36	4.81	trace	2.22	4.41	3.77	1.92	0.03	0.17		trace	trace		100.00	
68 B4. V	62.82	22.09	3.98	trace	1.23	3.58	3.37	2.00	0.75	0.18		trace	0.01		100.00	
69 D4. V	65.5	20.0	5.0	n. d.	2.6	0.7	0.4	7.0	0.8		trace				102.0	
70 C23. V?	60.10	18.80	2.87	0.95	1.15	1.08	8.15	4.65	2.00		1.02	trace			101.77 (100.57)	
71 C3. V	58.0	16.1	4.0	6.2	1.8	5.1	5.5	3.4	1.1						101.2	
72 C4. V	69.32	16.06	1.42	0.88	0.06	0.31	(6.01)	4.23	1.09		0.62				100.00	
73 B3. IV	65.09	14.43	3.21	0.13	0.10	1.18	7.26	3.24	2.42		2.50				99.56	
74 B3. IV	64.38	17.13	5.62	0.28	0.03	0.61	4.59	6.49	1.63		0.56			BaO SrO	none none	101.32
75 D2. V	60.73	18.16	4.63	0.20	0.31	0.10	4.88	6.21	1.33	0.72	0.60	none	0.10	CO ₂ Cl NiO	trace 0.03 trace	98.00
76 B3. IV	57.39	16.88	1.09	6.10	1.01	3.16	(6.71)	(5.89)	0.11	0.49	1.11		0.05	NiO	0.04	100.00
77 D4. V	68.22	16.89	2.75	n. d.	trace	trace	5.30	4.47	0.95						98.58	
78 D4. V	65.97	18.11	trace	4.82	trace	0.98	10.17	trace	0.56						100.61	
79 C4. V	55.87	18.21	n. d.	8.01	0.46	4.54	3.36	5.75	2.28				2.61		101.09	
80 C3. V	70.34	10.13	0.56	4.02	1.74	5.18	5.01	2.06	2.14						101.18	2.525
81 D4. V	70.34	15.40	4.65	n. d.	0.55	trace	4.35	4.65	0.57						100.21	2.57
82 D4. V	61.38	20.60	2.57	n. d.	0.40	2.18	9.70	none	1.98				1.19		100.00	2.590

TRACHYTE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
65	Alget Valley, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 154, 1888.	Quartz trachyte.	SiO ₂ includes loss. 3 decimals. Not in W. T.
66	Achalzik Basin, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 155, 1888.	Tridymite trachyte.	SiO ₂ includes loss. 3 decimals. Not in W. T.
67	Samsar Volcano, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 156, 1888.	Obsidian.	SiO ₂ includes loss. 3 decimals. Not in W. T.
68	Samsar Volcano, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 155, 1888.	Trachyte.	SiO ₂ includes loss. 3 decimals. Not in W. T.
69	San Miguel, Azores.	S. Traverso.	S. Traverso. Gior. Min., V, p. 197, 1894.	Trachyte.	In W. T., p. 401.
70	Cap des Biches, Cap Verde, Senegal.	Pisani.	J. Chantard. C. R., CXLIII, p. 921, 1906.	Trachyte.	Sum incorrect. Also in B. Soc. M. Fr., VII, p. 437, 1907.
71	Kadero, Kordofan.	Schweig.	G. Linck, N. J. B. B., XVII, p. 423, 1903.	Gauteite.	
72	Mount Flinders, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXIV, p. 88, 1909.	Trachyte.	Na ₂ O by difference.
73	Little Liverpool Range, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXIV, p. 98, 1909.	Soda trachyte.	
74	Dripping Rock, Nandewar Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 903, 1908.	Trachyte.	
75	Berum Buckle, Warrumbungle Mountains, New South Wales.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXII, p. 617, 1907.	Trachyte.	
76	Pinnacle Road, Canobolas Mountains, New South Wales.	H. I. Jensen.	Sussmilch and Jensen, Pr. Linn. Soc. N. S. W., XXXIV, p. 191, 1909.	Phonolitic trachyte.	Alkalies by difference.
77	Mounts Adam and Eve, Brit Brit, Victoria.	J. Dennant.	J. Dennant, Pr. R. Soc. Vict., XIV, p. 11, 1901.	Trachyte.	
78	Camels Hump, Mount Macedon, Victoria.	Newberry.	J. W. Gregory, Pr. R. Soc. Vict., XIV, p. 201, 1902.	Sölvbergite.	
79	Regatta Point, Port Cygnet, Tasmania.	White.	Macleod and White, Pr. R. Soc. Tasm. (1899), p. 25, 1900.	Sölvbergite.	MnO high. Cf. No. 9. I. 5.2.2. Not in W. T.
80	Tawheterangi, Hauraki, New Zealand.	W. A. McLeod.	W. A. McLeod, Tr. N. Z. Inst., XXXI, p. 490, 1899.	Trachyte.	In W. T., p. 401.
81	Cass Peak, Banks Peninsula, New Zealand.	Students.	R. Speight, Tr. N. Z. Inst., XL, p. 180, 1908.	Trachyte.	
82	Lyttleton Crater, New Zealand.	Survey laboratory.	H. Filhol, III, p. 115, 1885.	Soda trachyte.	Border of dike. In W. T., p. 401.

TRACHYTE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
83 D4. V	60.69	17.75	3.83	n. d.	1.43	1.20	13.10	trace	0.79				1.21		100.00	
84 D4. V	52.18	20.00	5.00	n. d.	1.03	4.92	14.57	2.30	n. d.						100.00	
85 C4. V	66.03	20.52	3.24	n. d.	n. d.	1.32	2.43	2.47	4.24						100.25	
86 C4. V	64.71	18.40	3.72	n. d.	trace	1.83	5.01	4.20	2.26						100.13	
87 C3. V	63.56	15.32	4.29	2.85	0.21	1.90	6.48	2.09	1.21		0.40				98.31 (100.83)	

KERATOPHYRE.

1 D4. V	73.00	15.61	n. d.	1.95	n. d.	0.79	4.95	0.88	1.06					SO ₂ 0.76	99.00	2.63
2 B3. IV	71.24	12.20	1.71	5.44	0.13	0.98	4.29	1.86	0.81				0.97		99.63	
3 D4. V	59.36	26.85			0.16	1.85	5.57	4.07	n. d.						99.82	
4 D4. V	62.00	14.80	6.95	n. d.	0.92	3.65	2.96	0.95	5.60						97.83	
5 C4. V	79.36	11.54	0.63	n. d.	n. d.	0.50	6.20	0.51	0.95				1.35	S trace	101.04	2.620
6 C4. V	76.05	14.75	1.55	n. d.	0.95	0.07	0.39	3.26	2.65		trace			S trace	99.67	2.702
7 C4. V	75.60	13.46	3.14	n. d.	0.61	0.25	0.79	2.71	2.75						99.31	2.638
8 C4. V	72.83	14.92	2.28	n. d.	0.32	2.07	2.87	1.46	2.00					CO ₂ 1.23	100.27	2.676
9 C4. V	72.38	13.63	2.83	n. d.	trace	1.10	3.64	1.37	1.87				1.69	CO ₂ 1.23 S trace	99.74	2.651
10 C4. V	71.00	17.49	2.55	n. d.	0.87	0.25	1.45	3.30	2.96		trace			CO ₂ 0.15	100.02	2.684
11 C4. V	70.10	18.93	2.62	n. d.	0.41	0.38	2.75	1.93	2.70		trace	0.35			100.17	2.662
12 D4. V	65.53	22.75	1.79	n. d.	0.18	0.26	0.74	3.16	3.51						97.92	2.711
13 C4. V	64.04	20.98	3.15	n. d.	1.17	0.39	0.43	5.22	3.94		trace	0.38			99.70	2.670
14 C4. V	63.05	25.14	1.23	n. d.	0.36	0.68	5.79	1.81	2.30						100.36	2.638

TRACHYTE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
83	Lyttleton Crater, New Zealand.	Survey laboratory.	H. Filhol, III, p. 115, 1885.	Soda trachyte.	Center of dike. In W. T., p. 401.
84	Lyttleton Crater, New Zealand.	Survey laboratory.	H. Filhol, III, p. 116, 1885.	Soda trachyte.	Center of dike. In W. T., p. 401.
85	Matofao, Tutuila Island, Samoa.	Hobein.	M. Weber, Abh. Bay. Ak. W., XXIV, p. 296, 1909.	Phonolitic trachyte.	
86	Pola Island, Vatia, Tutuila Island, Samoa.	Hobein.	M. Weber, Abh. Bay. Ak. W., XXIV, p. 300, 1909.	Trachyte.	
87	Mount Lyall, Campbell Island.	P. Marshall.	P. Marshall, Subant. Islds., II, p. 692, 1909.	Trachyte.	

KERATOPHYRE.

1	Baraboo, Wisconsin.	C. F. Austin.	S. Weidman, B. Un. Wisc., Sci. Ser., I, p. 47, 1895.	Quartz keratophyre.	In W. T., p. 393.
2	Baraboo Bluffs, Wisconsin.	W. Daniels.	S. Weidman, B. Un. Wisc., I, p. 47, 1895.	Quartz keratophyre.	In W. T., p. 219.
3	Cerro de Cacheuta, Argentina.	Not stated.	O. Stieglitz, T. M. P. M., XXX, p. 357, 1911.	Keratophyre.	Many other analyses in paper, all inferior.
4	Grand Evo, Belgium.	Lindemann.	E. Mathieu, B. Soc. Belg. G., XVII, p. 552, 1903.	Keratophyre.	
5	Kupferberg, Wipperfurth, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 606, 1893.	Keratophyre.	In W. T., p. 393.
6	Schameder, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 667, 1893.	Keratophyre tuff.	In W. T., p. 393.
7	Steimel, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 657, 1893.	Keratophyre tuff.	In W. T., p. 395.
8	Eichacker, near Hofolpe, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 691, 1893.	Keratophyre tuff.	In W. T., p. 395.
9	Wiebelsaal, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 616, 1893.	Keratophyre tuff.	In W. T., p. 395.
10	Kromel, near Schameder, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 668, 1893.	Keratophyre tuff.	In W. T., p. 395.
11	Steimel, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 651, 1893.	Keratophyre tuff.	In W. T., p. 395.
12	Züschen, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 676, 1893.	Keratophyre tuff.	In W. T., p. 395.
13	Steimel, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 651, 1893.	Keratophyre tuff.	In W. T., p. 395.
14	Kupferberg, Wipperfurth, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 606, 1893.	Keratophyre.	In W. T., p. 395.

KERATOPHYRE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
15 C4. V	54.38	32.70	1.86	n. d.	0.20	0.35	1.30	5.40	4.22						100.41	2.742
16 C4. V	49.38	22.31	3.60	10.96	3.35	trace	4.16	0.59	4.50				0.83	8 0.14	99.82	2.740
17 C4. V	78.17	15.29	1.03	n. d.	0.48	n. d.	0.43	2.61	1.33						99.34	
18 B4. V	77.31	10.31	3.18	n. d.	0.88	0.43	6.31	0.89	1.08						100.39	
19 A4. V	76.51	12.92	0.58	n. d.	0.33	n. d.	2.93	6.51	0.72						100.50	
20 B4. V	75.99	14.22	0.92	n. d.	0.54	n. d.	2.62	4.91	1.58						100.78	
21 C4. V	66.43	18.07	1.57	n. d.	0.48	0.36	1.06	11.45	0.56						99.98	
22 B3. IV	66.09	18.85	0.91	n. d.	1.53	1.09	10.84	0.48	1.17		0.23				101.19	
23 C4. V	76.23	15.11			0.12	0.60	5.38	1.90	1.17						100.41	
24 C4. V	74.92	13.21	0.87	n. d.	0.71	0.40	4.92	0.66	3.57						99.26	
25 D4. V	74.27	13.59	2.03	n. d.	1.32	0.73	4.66	0.81	1.42						98.83	
26 C4. V	74.09	12.48	2.15	n. d.	1.08	0.60	5.01	1.52	2.42						99.35	
27 C4. V	72.34	14.07	2.92	n. d.	1.27	0.41	6.28	1.13	1.41						99.83	
28 D4. V	71.39	10.20	6.52	n. d.	0.91	0.61	5.28	2.21	1.94						99.07	
29 D4. V	70.50	15.90	1.03	n. d.	1.42	1.57	4.90	2.70	1.21						99.23	
30 C4. V	81.29	11.59	0.39	n. d.	0.26	0.15	0.28								99.83	
31 C4. V	70.78	16.21	3.06	n. d.	trace	1.26	6.31	0.84	0.87				0.21		99.54	
32 C4. V	69.81	16.02	3.31	n. d.	0.36	0.97	6.71	0.93	0.74				0.25		99.10	

KERATOPHYRE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
15	Siesel, near Pasel, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 622, 1893.	Quartz keratophyre.	Altered. In W. T., p. 395.
16	Kupferberg, Wipperfurth, Westphalia.	Bömer.	O. Mügge, N. J. B. B., VIII, p. 606, 1893.	Keratophyre.	Altered. In W. T., p. 395.
17	Fleckberg, Thuringia.	A. Johnsen.	A. Johnsen, N. J. B. B., XXVII, p. 387, 1909.	Keratophyre tuff.	
18	Lindig, Thuringia.	A. Johnsen.	A. Johnsen, N. J. B. B., XXVII, p. 369, 1909.	Keratophyre.	
19	Masserthal, Thuringia.	Partheil and Johnsen.	A. Johnsen, XXVII, p. 359, 1909.	Quartz keratophyre.	
20	Jagdschirm, Thuringia.	Johnsen and Partheil.	A. Johnsen, N. J. B., XXVII, p. 376, 1909.	Keratophyre tuff.	
21	Olzer Stieg, Thuringia.	A. Johnsen.	A. Johnsen, N. J. B. B., XXVII, p. 385, 1909.	Keratophyre tuff.	
22	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 169, 1902.	Albitite.	
23	Ai Danil, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Keratophyre.	In W. T., p. 395.
24	Monastery of St. George, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Keratophyre.	In W. T., p. 395.
25	Monastery of St. George, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Keratophyre.	In W. T., p. 395.
26	Monastery of St. George, Crimea.	A. Lagorio.	A. Lagorio, Cong. G., Int., VII, Guide XXXIII, p. 27, 1897.	Keratophyre.	In W. T., p. 131.
27	Monastery of St. George, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Keratophyre.	In W. T., p. 157.
28	Seragoz, near Ouraga, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Taurite (keratophyre).	In W. T., p. 395.
29	Cape Parthenit, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Keratophyre.	In W. T., p. 395.
30	Debaroa, Eritrea.	E. Manasse.	E. Manasse, Stud. Pat. Erit., p. 110, 1909.	Keratophyre.	Altered.
31	Shuang-Miao, Chi-li, China.	O. Mann.	O. Fleischmann, In. Diss. Leip., p. 21, 1903.	Quartz keratophyre.	
32	Lo-tho-liang, Chi-li, China.	O. Mann.	O. Fleischmann, In. Diss. Leip., p. 21, 1903.	Quartz keratophyre.	

MONZONITE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 B3. V	37.32	19.30	n. d.	16.10	10.81	1.47	0.33	8.55	3.01	0.14	0.87	0.19	0.10	CO ₂ trace S 0.56 Cu trace	98.75	
2 B4. V	57.11	17.00	12.48	n. d.	1.78	3.99	3.96	2.59			1.59				100.50	
3 D3. V	49.25	16.97	15.21	n. d.	3.00 (Ca)	7.17	4.91	2.01	0.30 (Ca)		1.41	0.76		CO ₂ trace	100.99 (Ca)	
4 C2. IV	50.35	15.76	2.32	7.30	7.40	10.12	2.75	3.89	0.45		0.30	0.39	0.35		101.38	
5 B3. IV	48.75	20.10	1.70	6.50	8.42	3.12	2.18	5.71	1.45			0.06		CO ₂ 1.30	100.45	

DIORITE.

1 D3. V	46.09	17.89	14.22	n. d.	5.04	10.30	3.82	1.10	0.26		3.45	0.05	0.28	S 0.47	102.87	
2 D4. V	52.47	25.54	6.31	n. d.	2.31	6.62	3.23	0.54	1.28			1.16			99.46	2.870
3 B3. IV	49.80	12.89	18.19	0.10	2.85	5.87	4.58	0.24	2.16		1.82	0.58	1.08	BaO 0.28	99.94	2.91
4 B4. V	46.75	17.61	16.79	n. d.	5.12	9.46	2.56	0.55	0.92			0.25			100.01	
5 B4. V	42.44	25.51	19.20	n. d.	0.21	0.37	0.56	0.49	10.92			0.29			99.99	
6 B3. IV	46.65	16.29	n. d.	10.54	8.13	13.22	2.78	trace	1.56		1.03		trace	CO S 0.57 trace	100.77	
7 B4. V	62.41	13.91	9.87	n. d.	2.22	3.15	3.34	3.19	2.57						100.66	
8 C3. V	58.44	17.06	1.36	5.06	2.96	5.82	3.40	2.84	2.12	0.38	0.15	1.41	0.50		101.50	
9 C4. V	58.67	14.89	7.56	n. d.	1.79	5.68	7.69	2.69	0.57				1.00		100.54	
10 B3. IV	48.49	18.99	9.59	1.00	5.05	10.78	3.47	1.42	0.55	0.10					99.44	
11 D2. V	67.97	15.16	1.14	3.48	1.80	3.57	4.48	1.34	1.79		0.74		trace	Cl S SrO 0.04 0.03 trace	101.54	2.663
12 D2. V	63.00	16.43	1.06	3.40	2.38	4.09	3.89	3.66	2.73		0.89	0.19	0.05	S SrO 0.06 trace	101.83	2.671
13 C2. IV	62.63	16.89	2.58	2.60	3.57	6.33	3.39	1.58	0.61		0.82	0.25		S 0.06	101.26	2.751
14 C2. IV	59.66	18.45	2.17	3.30	1.84	4.70	5.21	2.70	2.33		0.53	0.34	trace	S 0.04	101.29	2.696

MONZONITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Le Roi Mine, Trail Creek District, British Columbia.	M. F. Connor.	R. W. Brock, pers. com.	Monzonite.	Altered.
2	Farsund, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., No. 5, p. 124, 1896.	Quartz monzonite.	In W. T., p. 391.
3	Dignaes, Gran, Norway.	Damm and Schmelck.	W. C. Brögger, Q. J. G. S., L, p. 19, 1894.	Olivine monzonite.	Cf. Eg. Kg., II, p. 49, 1895. In W. T., p. 391.
4	Smalingen, Fahlun, Sweden.	L. Schmelck.	W. C. Brögger, Eg. Kg., II, p. 46, 1895.	Olivine monzonite.	In W. T., p. 317.
5	Monte Somma, Italy.	Pisani.	A. Lacroix, N. Arch. Mus., (4), IX, p. 150, 1907.	Monzonite.	

DIORITE.

1	Hayne Fjord, Jones Sound, Ellesmere Land.	P. Schei.	C. Bugge, Rep. 2d Fram Exp., No. 22, p. 37, 1910.	Diorite porphyrite.	
2	Whitefish Bay, Rainy Lake, Ontario.	F. T. Shutt.	A. C. Lawson, Am. G., VII, p. 161, 1891.	Diorite.	In W. T., p. 409.
3	Port Coldwell, Ontario.	F. N. Sheller.	A. P. Coleman, Rep. Bur. Min. Ont., VII, (2), p. 148, 1898.	Diorite.	Not in W. T.
4	North Garden, Albemarle County, Virginia.	G. P. Merrill.	G. P. Merrill, Rocks and soils, p. 225, 1897.	Diorite.	Fresh. Not in W. T.
5	North Garden, Albemarle County, Virginia.	G. P. Merrill.	G. P. Merrill, Rocks and soils, p. 225, 1897.	Diorite.	Weathered. Not in W. T.
6	Summit of Mount St. Elias, Alaska.	E. Mattiolo.	V. Novarese in Filippi and Stella, Sped. Duca Abruz. a Mt. St. E., p. (5), 1897.	Diorite.	In W. T., p. 409.
7	Santa Anita Canyon, San Gabriel Mountains, California.	A. M. Strong.	Arnold and Strong, B. G. S. A., XVI, p. 201, 1905.	Diorite gneiss.	
8	Bodega Peninsula, Marin County, California.	V. C. Osmont.	V. C. Osmont, Un. Cal. B. Dep. G., IV, p. 47, 1904.	Diorite.	
9	Washoe County, Nevada.	J. W. Phillips.	W. C. Day, U. S. G. S. A. R. 18, V, p. 969, 1897.	Diorite.	In W. T., p. 409.
10	San José, Tamaulipas, Mexico.	G. I. Finlay.	G. I. Finlay, An. N. Y. Ac. Sci., XIV, p. 268, 1904.	Diorite.	
11	Cuesta de la Yareta, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 610, 1906.	Diorite porphyrite.	
12	Corral Negro, Jujuy, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 611, 1906.	Diorite porphyrite.	
13	Caldera, Rioja, Argentina.	Rethwisch.	F. Tannhäuser, N. J. B. B., XXII, p. 612, 1906.	Diorite porphyrite.	
14	Cuesta de la Cienega, San Juan, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 613, 1906.	Diorite porphyrite.	

DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
15 C3. V	60.13	17.49	2.89	3.35	5.30	3.72	4.42	3.02	1.04						101.36	
16 B3. IV	58.44	21.43	6.88	0.31	3.66	4.84	0.59	1.14	2.01		trace	0.23	trace	CO ₂ Cl 0.19 0.16	99.88	
17 B4. V	53.22	16.84	n. d.	9.27	6.48	8.53	3.54	1.39	0.95						100.22	
18 B3. IV	51.78	19.74	11.20	n. d.	4.52	7.17	1.76	0.99	1.32		0.80	0.07		Cl FeS ₂ 0.18 0.54	100.07	
19 B3. IV	55.68	20.94	3.72	3.09	4.75	5.07	2.49	1.74	2.63			0.16		Cl 0.03	100.30	
20 B3. IV	54.09	16.72	n. d.	9.38	5.58	8.35	1.23	0.97	2.58			0.39	0.52	Cl 0.05	99.86	
21 C2. IV	47.1	18.1	3.0	8.5	7.3	6.6	2.4	2.8	3.6		0.4		0.1		99.9	
22 C4. V	50.16	14.00	14.04	n. d.	7.62	9.60	3.97	n. d.	0.39						99.78 (99.69)	
23 C3. V	49.55	12.72	5.28	9.57	4.45	7.37	3.15	trace	3.31				trace	CO ₂ 4.75	100.15	
24 C3. V	48.50	14.15	7.15	8.26	6.65	10.77	1.97	0.12	3.10				0.33	CO ₂ FeS ₂ trace 0.10	101.10	
25 D4. V	48.40	14.30	16.20	n. d.	6.94	11.09	1.55	0.06	3.25				trace	CO ₂ S trace 1.61	103.40	
26 B3. IV	56.1	19.8	5.4	4.1	1.3	7.5	2.9	2.4	0.9						100.4	
27 D3. V	61.10	15.60	trace	5.38	4.52	4.32	2.90	4.12	2.00		1.03	0.31			101.28	
28 C3. V	51.80	22.70	1.74	5.45	5.01	7.12	2.58	2.07	0.87						99.34	
29 B3. IV	49.70	22.10	3.17	5.95	4.97	9.31	2.32	1.75	0.75						100.02	
30 D3. V	48.10	20.10	3.71	6.45	7.61	9.45	2.10	2.50	1.20						101.27	
31 B3. IV	48.80	20.50	4.20	6.35	8.65	8.15	1.52	1.40	1.00						100.57	
32 B3. IV	46.40	21.90	3.87	5.80	3.97	7.96	4.81	3.84	1.08						99.63	
33 C4. V	64.02	20.45	2.85	n. d.	1.28	4.51	3.34	3.54	n. d.						99.99	
34 B3. IV	55.72	21.35	n. d.	8.81	0.63	5.10	5.71	1.23	0.46		0.57		0.36		99.94	

DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
15	Rio Colorado, Juncal Valley, Argentina.	R. Müller.	A. Stelzner, Br. G. Argent., I, p. 212, 1885.	Andendiorite.	In W. T., p. 409.
16	Netherley Rothes, Morayshire, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc. Edin., VIII, p. 55, 1901.	Diorite.	Border of boss.
17	Netherley Rothes, Morayshire, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc. Edin., VIII, p. 55, 1901.	Diorite.	Near center of boss.
18	Netherley Rothes, Morayshire, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc. Edin., VIII, p. 55, 1901.	Diorite.	Center of boss.
19	Glen Liath, Morayshire, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc. Edin., VIII, p. 55, 1901.	Diorite.	
20	Dandaleith, Morayshire, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc. Edin., VIII, p. 55, 1901.	Diorite.	
21	Swinyards Hill, Malvern, England.	J. H. Player.	C. Callaway, Q. J. G. S., XLIX, p. 420, 1893.	Diorite.	In W. T., p. 269.
22	Killiney, County Dublin, Ireland.	S. Templeton.	J. P. O'Reilly, Fr. R. Iv. Ac. (3), VI, p. 22, 1900.	Epidiorite.	Not in W. T.
23	Revin, Faux Valley, Belgium.	C. Klement.	C. Klement, Ref., N. J., I, p. 71, 1890.	Diorite.	In W. T., p. 409.
24	Notre Dame de Meuse, Belgium.	C. Klement.	C. Klement, Ref., N. J., I, p. 71, 1890.	Diorite.	In W. T., p. 409.
25	Between Mairus and Laifour, Belgium.	C. Klement.	C. Klement, Ref., N. J., I, p. 71, 1890.	Diorite.	In W. T., p. 409.
26	Semaphore, St. Quay, Brittany.	Not stated.	J. de Lapparent, B. Soc. M. Fr., XXXIII, p. 265, 1910.	Diorite.	
27	Coume de Nere, Vallée du Lys, Pyrenees.	Pisani.	A. de Romeu, B. Soc. M. Fr., XXX, p. 147, 1907.	Microdiorite.	
28	Vallée de Valbonne, Pyrenees.	Pisani.	A. Lacroix, B. Sv. Ct. G. Fr., XI, No. 71, p. 31, 1900.	Diorite.	Inclusion in granite. Not in W. T.
29	Vallée de Valbonne, Pyrenees.	Pisani.	A. Lacroix, B. Sv. Ct. G. Fr., XI, No. 71, p. 31, 1900.	Diorite.	In W. T., p. 291.
30	Vallée de Valbonne, Pyrenees.	Pisani.	A. Lacroix, B. Sv. Ct. G. Fr., XI, No. 71, p. 31, 1900.	Diorite.	In W. T., p. 287.
31	Vallée de Valbonne, Pyrenees.	Pisani.	A. Lacroix, B. Sv. Ct. G. Fr., XI, No. 71, p. 31, 1900.	Diorite.	In W. T., p. 287.
32	Ullernas, Norway.	G. Forsberg.	W. C. Brögger, Z. K., XVI, p. 49, 1910.	Syenite diorite.	In W. T., p. 301.
33	Kockenhus, Kullen, Sweden.	L. Ramberg.	A. Hennig, Lund. Ün. Aars., XXXIV (2), No. 6, p. 41, 1898.	Banatite.	Not in W. T.
34	Kortfors, Orebro, Sweden.	H. Santesson.	H. Bäckström, G. F. F., XVI, p. 108, 1894.	Diorite.	Kugel in granite. In W. T., p. 409.

DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
35	53.77	20.86	n. d.	5.93	2.76	5.04	5.01	2.87	1.86		1.21				99.31	
C3. V																
36	54.59	21.26	2.76	3.41	1.61	4.84	6.36	4.96	1.32						101.11	
C3. V																
37	65.73	17.85	0.93	3.88	1.59	2.81	4.06	3.83	0.79						101.47	
C3. V																
38	64.76	17.06	1.06	3.63	2.99	2.74	3.67	3.60	1.74						101.25	
C3. V																
39	62.4	20.4	3.9	1.8	2.3	3.1	3.2	1.7	0.8						99.6	
C3. V																
40	56.68	18.00	4.46	4.60	2.92	5.30	4.91	2.81	0.70			0.65	trace	S trace	101.03	
B3. IV																
41	47.10	20.40	3.47	7.86	5.62	9.41	2.74	1.37	1.68		0.36	0.29	trace	S 0.05	100.35	
C2. IV																
42	46.72	26.33	1.34	3.52	3.83	14.00	3.04	0.51	1.02		trace		trace	S 0.11	100.42	2.884
C3. V																
43	62.83	18.66	1.05	4.44	2.37	3.65	3.60	1.28	2.69						100.57	
B3. IV																
44	55.43	20.02	2.73	5.06	6.58	3.59	2.98	1.86	1.65		0.76				100.66	
B3. IV																
45	48.95	19.48	10.37	1.26	5.71	6.18	4.06	2.00	1.36		0.58				99.95	
B3. IV																
46	45.06	23.45	1.38	3.82	10.34	9.45	3.26	0.73	1.23		0.30				99.02	
C3. V																
47	55.40	16.80	9.25	n. d.	5.19	7.60	3.60	1.39	1.25						100.48	
B4. V																
48	46.95	20.35	9.65	n. d.	4.60	12.07	3.38	1.02	1.00						99.02	
C4. V																
49	42.44	21.05	4.67	8.61	3.17	15.90	2.84	1.21	1.09						100.98	
C3. V																
50	66.75	15.90	3.73	1.84	1.23	3.11	3.38	1.98	1.22						99.14	
B3. IV																
51	51.80	19.05	11.86	1.52	3.53	8.10	3.23	0.99	0.17						101.15	
B3. IV																
52	57.48	16.82	8.49	n. d.	4.64	5.45	2.63	4.57	0.25						100.33	
B4. V																
53	56.77	20.02	6.40	n. d.	3.70	5.40	4.01	3.94	0.13						100.36	
C4. V																
54	68.19	20.43			0.50	4.25	6.83	0.89	n. d.						101.09	
D4. V																

DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
35	Slätmossa, Sweden.	H. Bäckström.	H. Bäckström, G. F. F., IX, p. 360, 1887.	Diorite.	Kugel in granite. In W. T., p. 409.
36	Wirvik, Finland.	B. Frosterus.	B. Frosterus, T. M. P. M., XIII, p. 188, 1892.	Diorite.	Kugel in granite. In W. T., p. 409.
37	Lippenhof, near Tryberg, Schwarzwald.	Alibegoff.	G. H. Williams, N. J. B. B., II, p. 624, 1883.	Diorite.	In W. T., p. 409.
38	Lippenhof, near Tryberg, Schwarzwald.	Gattermann.	G. H. Williams, N. J. B. B., II, p. 624, 1883.	Diorite.	In W. T., p. 223.
39	Fuchsberg, Riesengebirge.	W. Herz.	L. Milch, N. J. B. B., XV, p. 184, 1902.	Diorite.	
40	Sopot, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien, LIX, p. 149, 1909.	Diorite.	
41	Deutsch-Brانيتz, Brünn, Moravia.	C. v. John.	v. John and Suess, Jb. G. R.-A. Wien, LVIII (1), p. 249, 1908.	Diorite.	
42	Senftenberg, Lower Austria.	J. Morozewicz.	J. Morozewicz, Ref. N. J., 1903, II, p. 367.	Diorite.	
43	Trattenscharte, Schladminger Tauern, Styria.	J. A. Ippen.	J. A. Ippen, Mt. Nw. Ver. Steierm., p. 131, 1901.	Diorite.	Methods poor.
44	Preinthale Hütte, Schladminger Tauern, Styria.	J. A. Ippen.	J. A. Ippen, Mt. Nw. Ver. Steierm., p. 131, 1901.	Diorite.	Methods poor.
45	Trattenscharte, Schladminger Tauern, Styria.	J. A. Ippen.	J. A. Ippen, Mt. Nw. Ver. Steierm., p. 131, 1901.	Diorite.	Methods poor.
46	Kaltenbach Hütte, Schladminger Tauern, Styria.	J. A. Ippen.	J. A. Ippen, Mt. Nw. Ver. Steierm., p. 131, 1901.	Diorite.	Schliere. Methods poor.
47	Kisowa, Schemnitz, Hungary.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XXXVIII, p. 350, 1888.	Diorite.	In W. T., p. 409.
48	Jablanica, Herzegowina.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XXXVIII, p. 349, 1888.	Diorite.	In W. T., p. 411.
49	Mal Inverno, Monzoni, Tyrol.	C. Doelter.	C. Doelter, T. M. P. M., XXI, p. 75, 1902.	Diorite.	
50	Val Moja, near Edolo, Lombardy.	C. Riva.	C. Riva, At. Soc. It. Mil., XXXVI, p. 141, 1896.	Diorite.	In W. T., p. 411.
51	Val Moja, near Edolo, Lombardy.	C. Riva.	C. Riva, Ref. N. J., II, p. 64, 1897.	Diorite porphyrite.	In W. T., p. 411.
52	Passo di Campo, Lago d'Arno, Lombardy.	C. Riva.	C. Riva, At. Soc. It. Mil., XXXVII, p. 84, 1897.	Diorite.	In W. T., p. 411.
53	Lago d'Arno, Lombardy.	C. Riva.	C. Riva, At. Soc. It. Mil., XXXVII, p. 84, 1897.	Diorite.	In W. T., p. 411.
54	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord. I, p. 154, 1902.	Diorite.	

DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
55 D4. V	62.00	22.71	0.85	n. d.	0.21	7.12	6.70	0.43	1.38						101.40	
56 D4. V	60.42	23.38	0.52	n. d.	0.36	7.68	6.93	0.48	1.81						101.58	
57 D4. V	56.87	25.62			0.66	9.55	6.18	0.81	1.79						101.48	
58 D4. V	56.65	25.59	0.57	n. d.	0.34	8.22	6.62	0.25	2.38						100.62	
59 D3. V	62.20	19.63	1.13	5.93	1.51	6.64	4.54	1.06	0.86						101.50 (100.70)	
60 D3. V	56.03	21.43	1.48	1.97	2.05	11.03	1.01	0.91	2.85						98.76	
61 C3. V	48.57	22.40	4.69	3.49	3.95	13.25	2.80	0.17	0.98						100.30	
62 D3. V	49.50	19.61	2.38	6.66	5.28	10.75	4.99	2.35	0.64						102.20	
63 D3. V	44.74	14.29	2.84	7.49	11.48	13.70	1.56	0.45	1.99						98.59	
64 B3. IV	46.88	13.84	0.20	9.20	12.63	13.13	1.89	0.25	2.40		0.71		0.03		101.16	
65 C3. V	60.56	17.00	1.98	3.22	2.55	2.96	2.72	4.26	4.14						99.39	
66 C3. V	57.69	17.38	1.15	7.83	2.59	4.30	2.24	4.94	1.11						99.23	
67 B4. V	47.32	14.96	5.09	9.88	6.44	9.50	3.15	n. d.	2.80						99.14	
68 C3. V	47.25	12.19	1.11	9.83	6.76	11.74	2.20	0.07	7.85						99.00	
69 B4. V	60.23	15.96	7.47	n. d.	2.64	8.19	3.73	0.98	0.89						100.09	
70 B3. IV	64.4	15.5	1.1	2.5	2.1	3.6	7.0	2.9	0.5		1.2				100.8 (99.6)	
71 D4. V	53.06	18.41	9.12	n. d.	4.74	8.98	4.27		0.37						100.00	
72 C3. V	53.73	23.68	1.11	1.94	3.65	3.05	3.34	4.80	0.48	0.09	0.30	0.13	0.16		99.46	
73 A4. IV	48.88	16.45	9.76	n. d.	7.16	11.90	2.95	0.44	1.88				0.60		100.02	
74 C4. V	63.77	16.30	7.49	n. d.	2.49	6.33	3.68	1.21	none						101.27	

DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
55	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 134, 1902.	Plagioplite.	
56	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 134, 1902.	Diorite aplite.	
57	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 134, 1902.	Diorite aplite.	Not fresh.
58	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 134, 1902.	Plagioplite.	Not fresh.
59	Gladkaia Sopka, Wagran Basin, Ural Mountains.	Not stated.	Duparc and Pearce, C. R., CXL, p. 1615, 1905.	Gladkaite (quartz diorite).	
60	Dshakys, Tau Mountains, Ural Mountains.	L. Lessing.	E. Jeremina, Btr. Exp. Mugo., p. 130, 1905.	Diorite.	
61	Bochtybai, Mugodjaren, Ural Mountains.	Leberta.	Jeremina and Loewinson- Lessing, Trav. Soc. Nat. St. P., XXXIII, p. 155, 1905.	Microdiorite.	
62	Beresowska, Ural Mountains.	Loewinson-Lessing.	Loewinson-Lessing, G. Sk. Jushno. Dorpat., p. 244, 1900.	Syenite-diorite.	In W. T., p. 411.
63	Supreya, Deneshkin Kamen, Ural Mountains.	Loewinson-Lessing.	Loewinson-Lessing, G. Sk. Jushno. Dorpat., p. 166, 1900.	Microdiorite.	In W. T., p. 411.
64	Golaia Gora, Tagil District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 360, 1910.	Diorite.	Not fresh.
65	Saadon, Caucasus.	Loewinson-Lessing and Beljankin.	Loewinson-Lessing, Vh. Rus. M. Ges., XLII, p. 245, 1905.	Chlorite banatite.	Not fresh.
66	Darial, Kasbek, Caucasus.	Loewinson-Lessing and Sewastjanow.	Loewinson-Lessing, Mat. G. Rus., XXI, p. 107, 1901.	Syenite-diorite.	Ségregation in granite.
67	Assa, Caucasus.	Loewinson-Lessing and Krikmeyer.	Loewinson-Lessing, Ref., N. J., II, p. 234, 1899.	Metadiorite.	In W. T., p. 411.
68	Caucasus.	Loewinson-Lessing and Krikmeyer.	Loewinson-Lessing, Ref., N. J., II, p. 234, 1899.	Metadiorite.	In W. T., p. 411.
69	Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXII, No. 2, p. 32, 1900.	Microdiorite.	In W. T., p. 411.
70	Gebel Doukhan, Egypt.	Not stated.	Couyat, C. R., CXLVII, p. 868, 1908.	Diorite.	
71	Mount Stanley, Ruwendzori, Uganda.	A. Roccati.	A. Roccati in Duca Abruzzi, II Ruwendzori, p. 224, 1909.	Diorite.	
72	Anabar River, Siberia.	H. Backlund.	H. Backlund, Trav. Mus. G. Pet. Gr., I, p. 141, 1907.	Diorite?	
73	Taimgeya River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 56.	Diorite.	
74	Arthur's Seat, Shevaroy Hills, Madras, India.	T. L. Walker.	T. H. Holland, Mem. G. S. Ind., XXVIII, p. 151, 1900.	Hypersthene diorite.	In W. T., p. 411. Cf. No. 213. II. 4.3.4.

DIORITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
75 B3. IV	54.34	17.53	8.21	0.20	3.07	7.54	2.74	1.59	2.51		0.59	2.23			100.55	2.90
76 B3. IV	51.48	20.31	6.24	3.46	4.29	8.86	3.01	2.07	0.75	0.16					100.63	
77 C3. V	51.08	1.47	3.57	25.30	4.12	8.15	2.13	0.22	3.54	0.32					99.90	
78 C3. V	50.71	4.74	2.26	20.64	4.21	13.48	1.03	0.18	3.24	0.18					100.27	
79 C3. V	49.89	1.87	2.61	23.47	6.57	10.75	2.01	0.09	3.16	0.37					100.79	
80 C3. V	49.20	3.64	0.84	25.00	6.76	10.66	0.76	0.06	3.24	0.46					100.62	
81 C3. V	50.67	21.21	11.31	0.21	4.10	6.86	1.41	0.10	2.74	0.50					99.11	
82 C3. V	47.94	21.96	2.48	3.42	6.83	12.63	1.49	0.19	2.26	0.12					99.35	
83 B3. IV	48.12	16.57	2.60	3.27	6.67	10.42	5.79	1.16	4.04		0.36				99.00	
84 C3. V	50.00	20.96	3.29	7.32	4.84	8.02	3.17	1.50	0.83			0.11			100.04	2.893
85 C4. V	41.66	17.46	10.40	n. d.	4.54	8.54	0.44	0.74	14.76	0.76					99.30	

PORPHYRITE.

1 C2. IV	46.91	16.67	11.46	5.57	3.61	6.06	3.86	0.78	n. d.		3.23	1.08	trace		99.23	
2 B4. V	51.93	18.13	8.92	n. d.	5.30	9.82	4.34	1.42	0.69						100.75	
3 B3. IV	49.65	16.36	4.39	7.19	8.00	9.18	2.49	1.17	2.39						100.82	
4 C4. IV	40.02	16.13	n. d.	14.98	12.90	1.05	0.67	8.17	2.82	0.13	0.46	0.30	0.11	CO ₂ 0.24 S 0.39	98.37	
5 C3. V	60.84	20.03	1.47	0.42	0.45	1.56	9.12	4.43	1.15					CO ₂ 0.11 SO ₂ 0.06	99.64	2.683
6 C4. V	62.20	21.18	1.42	n. d.	trace	2.20	9.60	2.60	(0.80)						100.00	
7 C4. V	57.50	27.61	2.00	n. d.	2.17	2.10	6.11	1.30	1.91			trace			100.70	
8 C4. V	52.59	18.57	8.62	n. d.	9.18	1.94	1.12	3.99	3.11						99.11	

DIORITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
75	Chin-chao yi, West Kansu, China.	C. Pfeil.	K. Futterer, Durch Asien, III, (4), p. 23, 1911.	Diorite.	Iron oxides? P_2O_5 high.
76	Gold Creek, Benguet, Luzon, Philippine Islands.	P. J. Fox.	A. J. Eveland, Phil. J. Sci., (A), II, p. 224, 1907.	Diorite.	
77	Antamok River, Benguet, Luzon, Philippine Islands.	R. F. Bacon.	A. J. Eveland, Phil. J. Sci., (A), II, p. 224, 1907.	Diorite.	Al_2O_3 and iron oxides?
78	Baguio District, Benguet, Luzon, Philippine Islands.	R. F. Bacon.	A. J. Eveland, Phil. J. Sci., (A), II, p. 224, 1907.	Diorite.	Al_2O_3 and iron oxides?
79	Baguio District, Benguet, Luzon, Philippine Islands.	R. F. Bacon.	A. J. Eveland, Phil. J. Sci., (A), II, p. 224, 1907.	Diorite.	Al_2O_3 and iron oxides?
80	Antamok, River, Benguet Luzon, Philippine Islands.	R. F. Bacon.	A. J. Eveland, Phil. J. Sci., (A), II, p. 224, 1907.	Diorite.	Al_2O_3 and iron oxides?
81	Mancayan, Lepanto, Luzon, Philippine Islands.	L. S. Salinger.	A. J. Eveland, Min. Bur. Manila B. 4, p. 39, 1905.	Diorite.	
82	Mancayan, Lepanto, Luzon, Philippine Islands.	L. S. Salinger.	A. J. Eveland, Min. Bur. Manila B. 4, p. 39, 1905.	Diorite.	
83	Kabaena Island, Celebes.	Tillmann.	W. Wunderlein, Samml. G. Mus. Leid., IX, p. 248, 1913.	Diorite.	
84	Ajer Loewoh, Sumatra.	Reuter.	R. D. M. Uerbeek, Sum. Westk., p. 232, 1883.	Diorite.	Not in W. T.
85	All Nations mine, Matlock, Victoria.	F. E. A. Stone.	J. W. Gregory, Vict. Dep. Min. Spec. Rep., p. 31, 1905.	Diorite.	

PORPHYRITE.

1	Nain, Labrador.	A. Wichmann.	A. Wichmann, Z. D. G. G., XXXVI, p. 494, 1884.	Mica porphyrite.	In W. T., p. 285.
2	Kennebunkport, Maine.	H. A. Flint.	J. F. Kemp, Am. G., V, p. 138, 1890.	Augite porphyrite.	In W. T., p. 413.
3	Frogrock Lake, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, Minn. G. S. B. 2, p. 126, 1887.	Porphyrite.	In W. T., p. 331.
4	War Eagle mine, Trail Creek District, British Columbia.	M. F. Connor.	R. W. Brock, pers. com.	Porphyrite.	
5	Dunmoor Hill, Cheviot Hills, Scotland.	I. Macadam.	H. Kynaston, Tr. G. Soc. Edin., VII, p. 401, 1899.	Biotite porphyrite.	Na_2O high. Cf. ref. In W. T., p. 211.
6	Clermain, near Cluny, Saone-et-Loire, France.	Not stated.	Michel-Levy and Lacroix, B. Sv. Ct. G. Fr., VII, No. 45, p. 6, 1895.	Mica porphyrite.	H_2O by difference. In W. T., p. 413.
7	Clermain, near Cluny, Saone-et-Loire, France.	Not stated.	Michel-Levy and Lacroix, B. Sv. Ct. G. Fr., VII, No. 45, p. 7, 1895.	Mica porphyrite.	In W. T., p. 413
8	Pelvoux, Dauphiny, France.	P. Termier?	P. Termier, C. R., CXXIV, p. 635, 1897.	Porphyrite.	Not fresh. In W. T., p. 413.

PORPHYRITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9 C4. V	47.60	19.10	11.55	n. d.	6.95	7.82	3.50	1.94	2.98						101.44	
10 B4. V	49.34	14.52	16.05	n. d.	5.72	9.11	3.02	1.23	1.60						100.59	
11 D3. V	49.17	14.59	3.91	12.94	4.32	8.78	3.68	0.79	0.58						98.76	
12 C3. V	48.87	12.11	3.17	10.21	3.52	15.18	5.11	1.81	0.58		0.72		trace		101.28	3.1
13 D3. V	65.35	15.78	2.39	3.18	2.62	1.59	3.45	4.94	2.29						101.59	2.648
14 B3. IV	53.29	18.87	4.09	4.53	2.47	5.71	4.07	3.66	2.66						99.35	2.765
15 B4. V	64.86	16.67	6.92	n. d.	2.52	2.19	4.21	2.15	n. d.		0.14	0.13			99.79	2.663
16 B3. IV	60.22	16.96	6.34	0.80	1.05	3.19	5.53	4.32	1.53		trace	0.44		SO ₃ 0.07	100.45	2.662
17 A4. IV	54.60	18.52	5.90	n. d.	7.20	1.44	4.10	1.99	6.20						99.95	2.66
18 C4. V	50.22	20.18	10.46	n. d.	2.87	2.25	7.21	2.73	1.40					CO ₂ 4.03	100.35	2.60
19 B3. IV	64.23	14.88	8.46	0.44	2.35	1.85	2.11	3.01	3.19						100.52	2.56
20 B3. IV	59.44	18.97	5.25	1.72	0.85	6.85	3.08	2.46	1.22						99.84	2.65
21 B3. IV	54.44	19.97	7.52	0.52	5.15	3.11	2.26	3.58	4.18						100.73	2.62
22 D4. V	45.45	16.78	n. d.	15.66	3.07	10.19	2.77	1.42	2.85					CO ₂ 2.03	100.22	
23 B3. IV	75.21	11.78	2.89	0.55	0.31	1.94	2.84	2.63	1.85			0.74	0.26		101.00	
24 C3. V	72.36	12.88	4.54	0.27	0.93	2.31	4.63	1.99	1.19			0.13	0.12		101.35	
25 B3. IV	48.81	17.14	13.83	0.87	1.84	9.08	1.70	0.92	3.24				trace	CO ₂ 0.29 FeS ₂ 1.76	99.48	
26 B4. V	63.44	16.66	6.94	n. d.	3.15	5.14	1.81	2.24	0.85						100.23	
27 B3. IV	62.90	16.58	2.15	1.70	1.50	4.29	4.29	1.09	1.82					S CuO 0.89 2.73	99.94	
28 D4. V	52.90	18.54	7.03	n. d.	8.22	6.11	n. d.	n. d.	1.07						93.87	

PORPHYRITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	Pelvoux, Dauphiny, France.	P. Termier?	P. Termier, C. R., CXXIV, p. 635, 1897.	Porphyrite.	Fresh. In W. T., p. 413.
10	Työläjärvenoja, near Tammerfors, Finland.	H. Berghell.	J. J. Sederholm, B. C. G. Fin., No. 6, p. 66, 1899.	Uralite porphyrite.	Not in W. T.
11	Föglö, Finland.	H. Berghell.	B. Frosterus, Fin. G. Und., Bl. 25, p. 23, 1894.	Labradorite porphyrite.	In W. T., p. 413.
12	Pontelitschorr, Umptek, Kola. Finland.	H. Berghell.	V. Hackman, Fennia, XI, No. 2, p. 193, 1894.	Augite porphyrite.	In W. T., p. 349.
13	St. Ameriner Thal, Vogesen.	P. Eitner.	A. Osann, Abh. G. Kt. Els. Loth., III, p. 132, 1887.	Labradorite porphyrite.	In W. T., p. 413.
14	Barnabas Bridge, Murbach, Vogesen.	A. Denniger.	A. Osann, Abh. G. Kt. Els. Loth., III, p. 123, 1887.	Labradorite porphyry.	In W. T., p. 281.
15	Hasenberg, near Magdeburg, Hesse.	Bodländer.	F. Klockmann, Jb. Pr. G. L.-A., XI, p. 210, 1892.	Augite porphyrite.	In W. T., p. 413.
16	Wambacher Hof, Pfalz, Bavaria.	K. Klüss.	A. Leppla, Jb. Pr. G. L.-A., XIV, p. 139, 1894.	Porphyrite.	In W. T., p. 263.
17	Schniftenberg, near Oberwiesen, Pfalz, Bavaria.	P. Weidinger.	M. Schuster, Geog. Jbft., XXVI, p. 245, 1914.	Augite porphyrite.	
18	Morsfeld, Pfalz, Bavaria.	H. Niklas.	M. Schuster, Geog. Jbft., XXVI, p. 259, 1914.	Porphyrite.	
19	Wilsdruff, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 749, 1886.	Mica porphyrite.	In W. T., p. 219.
20	Kaufbach, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 754, 1886.	Augite porphyrite.	In W. T., p. 191.
21	Potschapel, Saxony.	W. Bruhns.	W. Bruhns, Z. D. G. G., XXXVIII, p. 748, 1886.	Hornblende porphyrite.	In W. T., p. 413.
22	Mühlenthal, Harz.	Streng.	K. A. Lossen, Jb. Pr. G. L.-A., VI, p. 213, 1886.	Labradorite porphyrite.	In W. T., p. 413.
23	Near Cimic, Moldauthal, Bohemia.	Neumann.	J. Klvana, Ref. N. J., 1898, I, p. 485.	Radiolite porphyrite.	In W. T., p. 415.
24	Near Klecanky, Moldauthal, Bohemia.	Neumann.	J. Klvana, Ref. N. J., 1898, I, p. 485.	Radiolite porphyrite.	In W. T., p. 415.
25	Lohovictal, near Kladno, Bohemia.	J. Friedrich.	F. Slavik, Arch. Landdf. Böh., XIV (2), p. 80, 1908.	Augite porphyrite.	
26	Cernygraben, Bachergebirge, Styria.	A. Pontoni.	A. Pontoni, T. M. P. M., XIV, p. 371, 1895.	Mica porphyrite.	In W. T., p. 415.
27	St. Wolfgang, Bachergebirge, Styria.	B. Trobei.	B. Trobei, Mt. N. w. Ver. Steierm., XLIV, p. 179, 1908.	Quartz porphyrite.	CuO high.
28	Mießling, Bachergebirge, Styria.	A. Pontoni.	A. Pontoni, T. M. P. M., XIV, p. 372, 1895.	Porphyrite.	In W. T., p. 415.

PORPHYRITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
29 B3. IV	63.85	20.76	2.09	0.60	0.25	0.66	7.69	1.96	0.71	1.30					99.87	
30 C3. V	70.92	16.56	0.91	1.56	0.58	3.65	3.18	1.71	1.08			0.93	trace		101.14	
31 D3. V	58.85	18.15	4.03	4.22	2.52	6.00	3.01	2.78	1.97						101.55	
32 C3. V	57.25	17.35	3.03	4.20	3.04	6.75	3.04	3.48	1.52			0.86		s 0.69	101.21	
33 B3. IV	59.73	20.39	1.41	3.39	1.01	1.98	8.24	1.10	2.22	0.33	1.16				100.96	2.72
34 B3. IV	53.82	17.65	8.49	1.93	4.42	2.98	5.34	0.82	2.82	0.20	1.98				100.45	2.76
35 B4. V	68.77	15.93	4.52	n. d.	2.04	2.88	2.52	2.21	1.86			trace			100.73	2.9
36 C3. V	53.71	25.51	7.19	1.74	1.24	4.60	4.50	1.15	0.20						99.84	
37 D4. IV	47.77	20.95	12.27	n. d.	0.54	8.18	4.31	1.88	2.26			0.43	1.05		99.64	
38 B4. V	57.00	17.71	7.92	n. d.	1.39	2.96	6.66	4.08	1.69			trace	trace		100.05	2.68
39 B4. V	48.18	16.55	11.05	n. d.	7.35	11.19	3.66	0.46	1.48		trace				99.92	3.04
40 B4. V	47.77	15.87	13.82	n. d.	5.97	11.95	3.97	0.22	1.02		trace				100.59	3.05
41 B4. V	68.00	12.56	3.26	n. d.	4.20	5.28	4.57	0.95	2.11						100.93	
42 B4. V	47.43	16.65	11.29	1.28	5.77	10.84	1.58	2.37	3.50						100.71	
43 B4. V	56.71	17.92	8.13	n. d.	4.27	7.67	2.59	0.44	3.22						100.35	
44 D4. V	54.10	15.91	7.18	n. d.	5.83	6.91	3.76	0.64	3.98						98.31	
45 C4. V	49.57	19.59	13.83	n. d.	7.25	3.82	1.20	0.36	5.19						100.81	
46 C4. V	48.97	21.32	0.58	7.20	10.55	4.94	2.04	0.42	3.90						99.92 (99.52)	
47 B4. V	46.27	16.87	14.70	n. d.	5.97	3.73	7.86	0.87	3.08						99.35	
48 D4. V	(55.29)	20.33	6.34	trace	6.62	5.89	2.97	1.63	0.38	0.55		trace	0.02		100.00	

PORPHYRITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
29	Varfalva, Tur-Toroczko range, Hungary.	S. v. Szentpetry.	S. v. Szentpetry, Muz. Füzt., I, p. 238, 1912.	Albite-oligoclase porphyrite.	
30	Ultenthal, Vintschgau, Tyrol.	C. v. John.	W. Hammer, Jb. G. R.-A. Wien, LIII, p. 80, 1904.	Aplitic porphyrite.	
31	Pradaccio, Tyrol.	C. v. John.	W. Hammer, Jb. G. R.-A. Wien, LIII, p. 71, 1904.	Porphyrite.	
32	Ultenthal, Vintschgau, Tyrol.	C. v. John.	W. Hammer, Jb. G. R.-A. Wien, LIII, p. 71, 1904.	Hornblende porphyrite.	
33	Engiselein, Verrucano, Switzerland.	L. Hezner?	R. Beder, In. Diss. Zür., p. 26, 1909.	Andesine porphyrite.	
34	Funckenstock, Verrucano, Switzerland.	L. Hezner?	R. Beder, In. Diss. Zür., p. 25, 1909.	Augite porphyrite.	
35	Cima Fontana Fredda, Carnic Alps, Veneto.	M. Gortani.	M. Gortani, Mem. Soc. Tosc., XXII, p. 172, 1906.	Quartz porphyrite.	
36	Val Moja, Adamello, Lombardy.	C. Riva.	C. Riva, Ref., N. J., II, p. 64, 1897.	Hornblende porphyrite.	In W. T., p. 415.
37	Valdieri, Alpi Marittimi, Piedmont.	G. Aichino.	S. Franchi, B. C. G. It., XXV, p. 245, 1894.	Hornblende porphyrite.	In W. T., p. 415.
38	Provaglio, Val Sabbia, Brescia, Italy.	C. Riva.	C. Riva, Gior. Min., IV, p. 200, 1893.	Hornblende porphyrite.	In W. T., p. 415.
39	Colle Sagnette, Po Valley, Italy.	G. Aichino.	S. Franchi, B. C. G. It., XXXI, p. 127, 1900.	Porphyrite.	In W. T., p. 415.
40	Lobbia di Viso, Po Valley, Italy.	G. Aichino.	S. Franchi, B. C. G. It., XXXI, p. 127, 1900.	Porphyrite.	In W. T., p. 415.
41	Jalguba, Olonez, Russia.	Not stated.	Loewinson-Lessing, Ref., N. J., 1890, II, p. 267.	Augite porphyrite.	In W. T., p. 415.
42	Jalguba, Olonez, Russia.	Not stated.	Loewinson-Lessing, Ref., N. J., 1890, II, p. 267.	Augite porphyrite.	In W. T., p. 415.
43	Alouchta, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Quartz porphyrite.	In W. T., p. 415.
44	Kourtzy, Simferopol, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXIII, p. 27, 1897.	Quartz porphyrite.	In W. T., p. 415.
45	Caucasus.	Jastrzembzsky.	Loewinson-Lessing, Ref., N. J., 1899, II, p. 234.	Porphyritoid.	In W. T., p. 415.
46	Caucasus.	Jastrzembzsky.	Loewinson-Lessing, Ref., N. J., 1899, II, p. 234.	Hornblende porphyrite.	In W. T., p. 415.
47	Roschka, Caucasus.	Makerow,	Loewinson-Lessing, Ref., N. J., 1899, II, p. 234.	Augite porphyrite.	In W. T., p. 415.
48	Goldabegh, Goktschai Lake, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 156, 1888.	Augite porphyrite.	SiO ₂ includes loss. 3 decimals. Not in W. T.

PORPHYRITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
49 D3. V	(45.70)	26.29	5.57	1.21	4.16	8.58	4.07	2.29	1.47	0.44	trace	0.22	0.01		100.00	
50 D4. V	(46.64)	21.26	12.40	n. d.	3.51	7.67	2.73	1.30	1.57	2.86		0.05	0.02		100.00	
51 D3. V	(46.30)	22.57	3.35	5.39	4.65	8.69	2.45	1.26	4.59	0.58		0.16	0.02		100.00	
52 B3. IV	56.12	21.37	5.03	1.97	1.65	7.80	3.80	0.62	1.62				trace		99.98	2.77
53 B3. IV	49.86	20.35	7.36	1.51	5.89	6.18	2.39	1.23	5.02						99.79	2.70
54 D2. V	55.28	16.68	3.07	4.40	2.38	5.90	3.45	2.03	2.86	0.26	1.54	0.31	0.33	FeS ₂ 0.03	98.52	2.72
55 D1. IV	59.27	17.80	2.46	3.39	2.39	5.39	4.87	2.51	1.18	0.31	0.62	0.44	0.10	CO ₂ 0.69 ZrO ₂ 0.05 Cl 0.07 S 0.33 Cr ₂ O ₃ none NiO 0.01 BaO none SrO none	101.88	2.86
56 B3. IV	72.39	14.42	0.56	0.30	1.85	0.85	5.93	1.23	1.13	0.55		trace			99.22	2.632
57 D3. V	64.00	19.11	2.22	2.80	2.17	5.13	1.12	0.14	1.01					CO ₂ 1.71 FeS ₂ 1.58	100.99 (101.10)	

ANDESITE.

1 B4. V	53.75	18.37	8.28	n. d.	5.63	3.22	7.05	1.20	3.34			trace	trace	CO ₂ trace	100.04	
2 C3. V	61.11	19.28	1.87	3.96	1.38	4.40	4.53	1.07	1.20				0.44		99.24	
3 C3. V	60.61	16.61	1.97	5.09	3.10	4.46	3.11	0.25	2.45					CO ₂ 1.57	99.22	
4 C3. V	52.94	14.70	2.52	7.80	4.49	6.56	3.09	0.04	2.04					CO ₂ 4.86	99.04	
5 D4. V	68.54	21.27			0.46	n. d.	3.45	4.15	2.12						99.99	
6 D4. V	68.53	21.31			0.43	n. d.	3.47	4.16	2.11						100.01	
7 D4. V	68.49	21.35			0.39	n. d.	3.49	4.17	2.10						99.99	
8 B3. IV	57.38	16.30	3.70	2.66	1.61	5.12	3.58	2.29	1.08		2.22		1.70	CO ₂ 2.66	100.30	2.745

PORPHYRITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
49	Chomi-Borjom Valley, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 153, 1888.	Labradorite porphyry.	SiO ₂ includes loss. 3 decimals. Not in W. T.
50	Kura Valley, near Tiflis, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 158, 1888.	Augite porphyrite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
51	Somkethien, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 155, 1888.	Labradorite porphyry.	SiO ₂ includes loss. 3 decimals. Not in W. T.
52	Tukchi River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 56, 1904.	Porphyrite.	
53	Kivangra River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 56, 1904.	Porphyrite.	
54	Zeia River, Amur District, Siberia.	P. Todakis.	E. Ahnert, Reg. Aurif. Sib., X, Taf. VII, 1910.	Porphyrite.	
55	Port Arkwright, Queensland.	H. I. Jensen.	H. I. Jensen, Pr. Linn. Soc. N. S. W., XXXI, p. 169, 1906.	Porphyrite.	
56	Tambo River, Noyang, Victoria.	A. W. Howitt.	A. W. Howitt, Tr. R. Soc. Vict., XX, p. 38, 1884.	Quartz mica porphyrite.	In W. T., p. 157.
57	Dandenong, Victoria.	H. C. Jenkins.	J. W. Gregory, Pr. R. Soc. Vict., XIV, p. 201, 1902.	Porphyrite.	Not fresh.

ANDESITE.

1	Neponset Valley, Massachusetts.	W. H. Walker.	F. Bascom, J. Ac. Sc. Phila. (2), XV, p. 153, 1912.	Soda andesite.	Cf. No. 2, II.5.2.5.
2	Marcellon, Wisconsin.	W. W. Daniels.	Hobbs and Leith, B. Un. Wisc., Sci. Ser., III, p. 262, 1907.	Augite andesite.	
3	Ely, Minnesota.	C. F. Sidener.	N. H. Winchell, Minn. G. S. A. R., XXIII, p. 204, 1895.	Felsite.	Not fresh. In W. T., p. 245.
4	Ely, Minnesota.	C. F. Sidener.	N. H. Winchell, Minn. G. S. A. R., XXIII, p. 204, 1895.	Felsite.	Not fresh. In W. T., p. 419.
5	Ravalli County, Montana.	O. J. Berry.	J. P. Rowe, B. Un. Mont. No. 17, p. 9, 1903.	Volcanic ash (andesite?).	Calculated to 100.
6	Ravalli County, Montana.	O. J. Berry.	J. P. Rowe, B. Un. Mont. No. 17, p. 9, 1903.	Volcanic ash (andesite?).	Calculated to 100.
7	Ravalli County, Montana.	O. J. Berry.	J. P. Rowe, B. Un. Mont. No. 17, p. 9, 1903.	Volcanic ash (andesite?).	Calculated to 100.
8	Boulder Mountain, Silverton, Colorado.	Gebhardt and Haldane.	F. R. Van Horn, B. G. S. A., XII, p. 8, 1901.	Andesite.	

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
9 B3. IV	57.29	19.93	2.95	3.39	1.55	5.67	3.34	1.92	1.53		1.42		0.75	CO ₂ none	99.74 (99.94)	2.66
10 B3. IV	56.93	17.61	3.04	3.24	1.77	5.03	3.97	2.93	0.74		0.98		2.23	CO ₂ 1.45	99.72	2.70
11 B3. IV	54.22	16.69	3.63	3.39	2.72	5.86	4.82	2.20	1.55		1.65		1.43	CO ₂ 2.53	100.69	2.695
12 B3. IV	56.36	15.46	5.00	1.85	2.00	5.28	4.91	2.73	1.34		0.83		1.49	CO ₂ 1.92	99.17	2.735
13 B3. IV	55.68	17.09	5.26	1.98	1.56	5.05	2.83	1.95	1.50		1.45		2.23	CO ₂ 2.97	99.55	2.725
14 C4. V	52.33	18.80	10.21	n. d.	4.19	8.22	3.84	3.62	n. d.					none	101.21	
15 B4. V	50.48	13.92	15.04	n. d.	4.08	11.28	3.61	0.36	n. d.				0.01	S 1.11	99.57	2.857
16 C3. V	52.17	16.59	8.32	n. d.	3.87	8.25	3.91	4.00	1.17	0.13	0.80	0.24	0.11	CO ₂ 0.56 BaO 0.15 SrO 0.05	101.69	2.852
17 D4. V	60.58	18.42	7.90	n. d.	1.53	8.16	n. d.	n. d.	1.83	1.81					100.23	
18 C4. V	54.86	15.04	4.92	3.11	1.88	9.19	11.30					0.46			100.76	
19 D3. V	60.00	19.01	3.20	0.68	1.28	4.10	6.97	2.79	4.30				trace		102.33	2.51- 2.54
20 B3. IV	52.83	17.67	7.50	1.68	2.47	7.35	6.61	2.52	2.32						100.95	2.80
21 B4. V	59.75	19.08	n. d.	2.91	4.72	6.15	4.31	0.92	2.64		trace	0.15			100.63	2.62
22 B3. IV	59.74	19.94	1.81	5.41	1.18	3.74	4.65	1.02	2.09		trace	0.35			99.93	2.64
23 C3. V	56.47	22.55	0.95	1.97	4.48	10.89	0.88	0.52	1.03						99.74	
24 B4. V	55.80	18.22	8.98	n. d.	2.23	4.40	6.34	1.90	2.30						100.17	
25 C4. V	64.50	16.82	n. d.	n. d.	1.76	1.08	3.00	3.80	1.63					CO ₂ 1.77 FeS ₂ 5.70	100.06	
26 C4. V	56.40	20.12	n. d.	5.87	1.99	3.55	4.87	2.56	2.41					CO ₂ 2.59 FeS ₂ 0.09	100.45	
27 C4. V	63.30	17.90	n. d.	1.83	2.53	10.45	2.30	n. d.	1.18						100.18	
28 C3. V	58.31	16.69	none	n. d.	1.27	5.29	0.20	6.11	2.42			0.31	0.19	CO ₂ 3.47 Cl trace FeS ₂ 5.06 BaO 0.35	99.67	

ANDESITE—Continued

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	Middleton, near Silverton, Colorado.	Gebhardt and Haldane.	F. R. Van Horn, B. G. S. A., XII, p. 8, 1901.	Andesite.	
10	Galena Mountain, Silverton, Colorado.	Gebhardt and Haldane.	F. R. Van Horn, B. G. S. A., XII, p. 8, 1901.	Andesite.	Not fresh.
11	Galena Mountain, Silverton, Colorado.	Gebhardt and Haldane.	F. R. Van Horn, B. G. S. A., XII, p. 8, 1901.	Andesite.	Not fresh.
12	King Solomon Mountain, Silverton, Colorado.	Gebhardt and Haldane.	F. R. Van Horn, B. G. S. A., XII, p. 8, 1901.	Andesite.	Not fresh.
13	King Solomon Mountain, Silverton, Colorado.	Gebhardt and Haldane.	F. R. Van Horn, B. G. S. A., XII, p. 8, 1901.	Andesite.	Not fresh.
14	Copper Mountain, Similkameen District, British Columbia.	O. N. Scott.	O. N. Scott, Can. Min. Inst., V, p. 496, 1902.	Andesite.	
15	Copper Mountain, Similkameen District, British Columbia.	O. N. Scott.	O. N. Scott, Can. Min. Inst., V, p. 494, 1902.	Andesite.	Not fresh.
16	Sayward, Rosland Mountains, British Columbia.	M. F. Connor.	R. A. Daly, Can. G. S. Mem. 38 (1), p. 329, 1912.	Latite.	
17	Lilliwaup, Washington.	R. W. Thatcher.	S. Shedd, Wash. G. S. A. R. II, p. 50, 1902.	Andesite tuff.	
18	Mount Tacoma, Washington.	F. Collischon.	K. Oebbeke, N. J., 1885, I, p. 226.	Andesite.	In W. T., p. 419.
19	Carmelo Bay, California.	J. Posada.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 42, 1893.	Carmeloite (augite andesite).	In W. T., p. 419.
20	Sunium Point, Carmelo Bay, California.	J. Posada.	A. C. Lawson, B. Dep. G. Un. Cal., I, p. 38, 1893.	Carmeloite.	In W. T., p. 419.
21	Frowning Ridge, Berkeley Hills, California.	C. Palache.	Lawson and Palache, B. Dep. G. Un. Cal., II, p. 426, 1901.	Andesite.	
22	Grizzly Peak, Berkeley Hills, California.	C. Palache.	Lawson and Palache, B. Dep. G. Un. Cal., II, p. 426, 1901.	Andesite.	
23	Pie Knob, Berkeley Hills, California.	Dickerman.	Lawson and Palache, B. Dep. G. Un. Cal., II, p. 426, 1901.	Andesite.	Corrected for 6.12 limonite.
24	Point Sal, California.	H. W. Fairbanks.	H. W. Fairbanks, B. Dep. G. Un. Cal., II, p. 50, 1896.	Andesite.	In W. T., p. 419.
25	Tonopah, Nevada.	G. J. Young.	J. A. Burgess, Ec. G., IV, p. 699, 1909.	Andesite.	Altered.
26	Mizpah shaft, Tonopah, Nevada.	G. J. Young.	J. A. Burgess, Ec. G., IV, p. 692, 1909.	Calcite andesite.	Altered.
27	Chairman mine, Robinson District, Nevada.	H. Ross.	A. C. Lawson, B. Dep. G. Un. Cal., IV, p. 324, 1906.	Augite andesite.	
28	Lane Valley, Robinson District, Nevada.	H. Ross.	A. C. Lawson, B. Dep. G. Un. Cal., IV, p. 322, 1906.	Porphyry.	Altered.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
29 A4. IV	59.22	18.20	n. d.	6.69	2.90	5.51	1.39	3.31	2.80						100.02	
30 A4. IV	58.44	18.17	n. d.	6.03	2.40	6.19	3.20	1.97	0.76					CO ₂ 2.87	100.03	
31 A4. IV	56.71	18.36	n. d.	6.45	3.92	6.11	3.52	2.38	1.94						99.39	
32 B4. V	65.03	18.83	2.35	n. d.	2.06	4.43	4.38	2.24	1.00						100.32	2.589
33 B4. V	64.48	16.50	3.47	n. d.	1.60	4.42	3.13	3.72	2.94						100.26	
34 A4. IV	61.06	15.42	8.01	n. d.	3.55	7.11	2.66	1.40	0.68		trace	trace	trace		99.89	2.658
35 B4. V	61.24	18.32	6.17	n. d.	3.76	5.06	3.15	2.37	0.67						100.74	2.612
36 B4. V	59.84	18.57	4.76	n. d.	2.95	4.69	2.85	2.72	4.10						100.48	2.177
37 B3. IV	53.68	16.96	5.00	2.41	1.79	10.18	3.55	0.76	0.48		0.88	0.51		CO ₂ 4.40 SO ₃ trace	100.60	2.736
38 C4. V	66.41	19.74	1.31	n. d.	0.92	3.20	4.41	2.99	0.06						99.04	
39 C4. V	56.73	20.44	5.71	n. d.	2.58	7.23	3.73	2.45	0.54						99.41	
40 D4. V	55.72	16.01	7.41	n. d.	2.81	8.59	4.79	3.30							98.63	2.41
41 C2. IV	60.31	23.20	0.89	4.20	3.42	5.58	2.12	0.62	0.12		1.18	0.12			101.76	
42 B4. IV	51.52	21.65	6.37	n. d.	4.72	10.00	3.55	0.68	0.06	0.19	1.00	0.14		SO ₂ 0.12	100.30	
43 C2. IV	50.72	12.55	9.48	4.68	5.91	10.10	3.45	0.53	0.55	0.13	1.15	0.19	0.45	SO ₃ 0.11	100.00	
44 C4. V	56.50	28.20			0.98	2.83	6.68	4.25	n. d.						99.44	
45 D4. V	59.13	17.00	7.03	n. d.	n. d.	6.67	4.80	1.37	0.16						96.16	
46 C4. V	57.24	18.02	3.46	4.13	3.77	7.78	(5.54)		0.06						100.00	
47 B4. V	62.80	16.36	n. d.	7.11	3.05	3.63	4.50	0.80	1.00						99.25	2.561
48 B4. V	62.30	14.46	n. d.	7.71	2.14	5.35	4.80	1.72	0.98						99.46	2.664

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
29	Silver Terrace, Washoe, Nevada.	W. G. Mixer.	G. F. Becker, U. S. G. S. Mon. 3, p. 152, 1882.	Andesite.	In W. T., p. 419.
30	American Flat, Washoe, Nevada.	W. G. Mixer.	G. F. Becker, U. S. G. S. Mon. 3, p. 152, 1882.	Andesite.	In W. T., p. 419.
31	Eldorado, Washoe, Nevada.	R. W. Woodward.	G. F. Becker, U. S. G. S. Mon. 3, p. 152, 1882.	Andesite.	In W. T., p. 419.
32	Nevado de Toluca, Mexico.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 458, 1887.	Andesite.	In W. T., p. 191.
33	N. S. de Guadalupe, near Mexico, Mexico.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 458, 1887.	Andesite.	In W. T., p. 185.
34	Cerro Guerrero, near Mexico, Mexico.	König.	H. Lenk in Felix and Lenk, Btr. G. Mex., I, p. 100, 1890.	Hypersthene andesite.	In W. T., p. 421.
35	Mount Iztaccihuatl, Mexico.	H. Lenk?	H. Lenk in Felix and Lenk, Btr. G. Mex., II, p. 229, 1899.	Hornblende andesite.	In W. T., p. 421.
36	Near Amecameca, Mexico.	H. Lenk?	H. Lenk in Felix and Lenk, Btr. G. Mex., II, p. 229, 1899.	Pumice.	In W. T., p. 421.
37	Ejutla, Oaxaca, Mexico.	A. Röhrig.	H. Lenk in Felix and Lenk, Btr. G. Mex., II, p. 140, 1899.	Hypersthene andesite.	In W. T., p. 421.
38	Eruption of October, 1902, Sta. Maria Volcano, Guatemala.	Siebenschank.	A. Bergeat, N. J. Ch., 1903, p. 291.	Andesite pumice.	
39	Irazu Volcano, Carthago, Costa Rica.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 467, 1887.	Andesite.	In W. T., p. 421.
40	Signal Hill, St. Eustatius, West Indies.	G. A. F. Molengraaf.	G. A. F. Molengraaf, G. St. Eust., p. 40, 1886.	Andesite.	Not in W. T.
41	St. Vincent, West Indies.	Pisani.	A. Lacroix, Mont Pelée, p. 599, 1904.	Cordierite andesite.	Inclusion in andesite.
42	Eruption of May, 1902, St. Vincent, West Indies.	D'Albuquerque.	J. S. Flett, Phil. Trans., CCVIII (A), p. 327, 1908.	Andesite ash.	Collected at Barbados. 3 decimals.
43	Eruption of May, 1902, St. Vincent, West Indies.	D'Albuquerque.	J. S. Flett, Phil. Trans., CCVIII, A, p. 327, 1908.	Andesite dust.	Collected at Barbados. 3 decimals.
44	Chatham Bay, Cocos Island, Galapagos Islands.	G. P. Merrill.	G. P. Merrill, B. Mus. Comp. Zool., XVI, No. 13, p. 237, 1893.	Andesite.	In W. T., p. 421.
45	Cerro Negro de Mayasquer, Colombia.	Buntzel.	R. Kuch, G. Stud. Colomb., I, p. 183, 1892.	Pyroxene andesite.	In W. T., p. 421.
46	Pasto Volcano, Colombia.	R. Kuch.	R. Kuch, G. Stud. Colomb., I, p. 141, 1892.	Pyroxene andesite.	In W. T., p. 421.
47	Zechzech, Alausi, Ecuador.	J. Siemiradzki.	J. Siemiradzki, N. J. B. B., IV, p. 209, 1886.	Hornblende andesite.	In W. T., p. 421.
48	Zechzech, Alausi, Ecuador.	J. Siemiradzki.	J. Siemiradzki, N. J. B. B., IV, p. 209, 1886.	Augite andesite.	In W. T., p. 421.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
49	60.34	15.63	n. d.	8.13	2.11	6.97	5.12	0.90	0.87						100.10	
B4. V																
50	60.10	15.56	n. d.	7.83	1.22	5.97	5.11	1.69	0.95						98.43	
D4. V																
51	55.64	21.45	5.41	6.58	3.10	5.59	3.08	1.60	n. d.						102.45	
D3. V																
52	68.18	16.86	6.12	n. d.	0.71	5.35	2.40	0.21	0.73			trace	trace		100.56	
C4. V																
53	65.39	17.20	6.39	n. d.	trace	5.74	2.73	0.47	0.59			trace	trace		98.51	
D4. V																
54	63.86	16.52	5.91	n. d.	1.60	3.71	3.16	2.47	0.93				trace		98.16	
D4. V																
55	68.05	17.95	2.97	n. d.	1.40	3.65	3.56	1.25	1.78			trace	trace		100.61	
B4. V																
56	54.58	23.21	5.33	2.44	0.76	11.37	2.69	n. d.	n. d.						100.38	
D4. V																
57	66.68	18.36	1.63	2.58	1.15	4.95	5.33	2.89	2.39		0.49	0.22	trace	CO ₂ S 0.74 0.03	101.44	2.663
C2. IV																
58	61.99	17.10	3.17	1.72	1.76	4.74	4.52	3.80	1.10		1.18	0.25		CO ₂ 0.48	101.81	2.720
D2. V																
59	63.60	16.20	4.02	0.82	2.24	4.29	3.84	4.13	1.61		0.52	0.19		S 0.04	101.50	2.640
C2. IV																
60	58.85	16.74	3.91	2.64	3.82	5.93	3.41	3.26	1.49		0.81	trace	trace	S SrO 0.03 trace	101.33	2.681
C2. IV																
61	57.35	17.54	3.33	3.87	4.29	6.91	4.01	2.54	0.79		0.64	0.08	trace	S 0.03	101.38	2.766
C2. IV																
62	61.30	14.15	0.91	2.86	2.46	4.63	5.47	3.62	2.03	0.24	0.54	0.71	0.08	CO ₂ S none 0.03	99.03 (98.99)	
C2. IV																
63	66.62	14.02	5.73	n. d.	0.33	2.74	6.93	1.51	2.83				trace		100.71	
A4. IV																
64	52.68	12.66	17.34	n. d.	0.93	11.45	2.49	1.91	0.70						100.16	
C4. V																
65	62.89	14.84	9.20	n. d.	0.37	3.61	4.01	2.91	1.41						99.24	
B4. V																
66	66.03	12.55	2.75	n. d.	2.33	2.80	5.02	4.13	4.20						99.81	
A4. IV																
67	55.79	15.97	12.50	n. d.	2.22	7.06	2.21	1.86	2.43					S 0.45	100.49	2.705
B4. V																
68	65.81	14.01	4.43	n. d.	0.89	2.01	4.15	6.08	2.70						100.08	
D4. V																

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
49	Zechzech, Alausi, Ecuador.	J. Siemiradzki.	J. Siemiradzki, N. J. B. B., IV, p. 209, 1886.	Hornblende-augite andesite.	In W. T., p. 421.
50	Zechzech, Alausi, Ecuador.	J. Siemiradzki.	J. Siemiradzki, N. J. B. B., IV, p. 209, 1886.	Hornblende-augite andesite.	In W. T., p. 421.
51	Rio de Alausi and Rio Chanchan, Ecuador.	J. Siemiradzki.	J. Siemiradzki, N. J., I, p. 156, 1885.	Hypersthene ^a andesite.	In W. T., p. 421.
52	Sajama Volcano, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 306, 1888.	Hornblende andesite.	In W. T., p. 421.
53	Sajama Volcano, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 306, 1888.	Hornblende andesite.	In W. T., p. 421.
54	Sajama Volcano, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 299, 1888.	Hornblende- pyroxene andesite.	In W. T., p. 421.
55	Cerro Quimsachata, Bolivia.	F. Rudolph.	F. Rudolph, T. M. P. M., IX, p. 311, 1888.	Quartz andesite.	In W. T., p. 421.
56	Osorno Volcano, Chile.	W. Bruhns.	W. Bruhns, Ref. N. J., II, p. 85, 1899.	Augite andesite.	In W. T., p. 421.
57	Cerro Tomaslata, San Luis, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 597, 1906.	Hornblende andesite.	
58	Canada Honda, Cerro del Valle, San Luis, Argentina.	Möller.	F. Tannhäuser, N. J. B. B., XXII, p. 595, 1906.	Hornblende andesite.	
59	San Geronimo, Salta, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 588, 1906.	Mica andesite.	
60	Tambo, Salta, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 601, 1906.	Pyroxene andesite.	
61	Hoyada, Catamarca, Argentina.	P. Jannasch.	F. Tannhäuser, N. J. B. B., XXII, p. 598, 1906.	Hornblende andesite.	
62	Miramar, Argentina.	J. G. Fairchild.	Wright and Fenner, Bur. Am. Ethn., B. 52, p. 75, 1912.	Andesite scoria.	
63	Beinn Hiant, Mull, Scotland.	T. H. Holland.	J. W. Judd, Q. J. G. S., XLVI, p. 379, 1890.	Andesite.	In W. T., p. 423.
64	Beinn Hiant, Mull, Scotland.	W. Tate.	J. W. Judd, Q. J. G. S., XLVI, p. 379, 1890.	Tholeite.	In W. T., p. 423.
65	Beinn Talaidh, Mull, Scotland.	T. H. Holland.	J. W. Judd, Q. J. G. S., XLVI, p. 349, 1890.	Propylite.	In W. T., p. 423.
66	Tormore, Arran, Scotland.	M. M. Tait.	J. W. Judd, Q. J. G. S., XLIX, p. 558, 1893.	Pitchstone.	In W. T., p. 423.
67	Cir Mhor Dike, Arran, Scotland.	Under Thorpe.	J. W. Judd, Q. J. G. S., XLIX, p. 545, 1893.	Andesite.	In W. T., p. 423.
68	Scur of Eigg, Scotland.	B. North.	J. W. Judd, Q. J. G. S., XLVI, p. 379, 1890.	Andesite.	In W. T., p. 423.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
69 D3. V	61.17	16.87	2.10	2.94	3.00	4.86	2.67	1.81	3.09						98.51	2.543
70 D3. V	57.57	14.42	6.04	3.95	4.24	6.87	2.98	1.08	1.55				0.27		98.97	
71 B3. IV	59.43	16.00	4.49	3.67	4.05	8.03	2.22	1.28	n. d.						99.17	
72 C3. V	59.40	19.57	3.89	2.18	2.28	5.22	1.22	2.47	(3.10)		0.55	trace	0.09		100.00	
73 D4. V	58.07	13.22	10.10	n. d.	4.46	7.04	2.59	1.58	1.50						98.56	
74 B4. V	57.80	16.18	10.07	n. d.	4.68	6.18	2.38	0.77	1.70						99.76	2.81
75 B3. IV	53.30	20.99	1.66	6.34	3.96	8.51	2.46	0.93	1.12			0.10		CO ₂ 0.32	99.69	
76 B3. IV	52.60	17.32	1.72	12.04	3.25	7.73	2.62	1.49	1.16			0.15		CO ₂ 0.14	100.22	
77 C3. V	48.37	20.74	6.56	0.63	6.35	7.77	1.70	n. d.	1.60			0.94		CO ₂ 6.00	100.66	
78 B4. V	61.8	16.5	6.7	n. d.	1.2	4.5	7.2	1.4	0.6						99.9	
79 C3. V	59.40	19.57	3.89	2.18	2.28	5.22	1.22	2.47	(3.10)		0.55	trace	0.09	SO ₂ 0.03	100.00	
80 C3. V	57.25	19.40	2.50	3.84	6.40	5.10	1.74	2.36	2.75						101.34	
81 C4. V	54.55	19.89	5.90	n. d.	4.05	3.72	3.65	3.42	5.95						101.01	
82 C3. V	66.56	19.77	0.96	1.00	1.97	0.10	6.63	3.99	(0.47)		0.46				101.44	2.536
83 C3. V	60.88	22.63	1.30	2.94	1.39	3.10	4.56	2.95	(0.39)		1.14				100.89	2.585
84 C3. V	56.29	24.12	2.47	3.20	1.39	6.13	5.36	1.90	(1.74)		0.41				101.17	2.674
85 C4. V	55.88	20.92	3.46	4.10	3.52	5.49	5.34	1.66	(0.26)		1.09				101.46	2.654
86 C4. V	57.50	27.61	2.00	n. d.	2.17	2.10	6.11	1.30	1.91			trace			100.70	
87 C4. V	63.47	18.76	3.74	n. d.	1.12	7.10	3.93	1.09	1.47			0.40	trace		101.08	
88 D4. V	62.91	18.31	5.55	n. d.	1.97	5.93	3.67	1.66	2.17			0.37			102.54	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
69	Carhope, Cheviot Hills, Scotland.	Petersen.	J. J. H. Teall, G. Mag., XXII, p. 118, 1885.	Hypersthene andesite.	In W. T., p. 423.
70	Cleveland Dike, Scotland.	Stock.	J. W. Judd, Q. J. G. S., XLVI, p. 379, 1890.	Tholeite.	In W. T., p. 423.
71	Bardon, Charnwood Forest, England.	Lord.	Hill and Bonney, Q. J. G. S., XLVII, p. 89, 1891.	Andesite.	In W. T., p. 423.
72	The Batch, Shropshire, England.	Reade and Holland.	Reade and Holland, Pr. G. Soc. Liv., X (4), Table IV, 1908.	Andesite tuff.	H ₂ O includes loss.
73	Armathwaite, England.	W. F. K. Stock.	J. J. H. Teall, Q. J. G. S., XL, p. 224, 1884.	Andesite.	In W. T., p. 423.
74	Acklington, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 243, 1884.	Andesite.	In W. T., p. 423.
75	Eycott Hill, Lake District, England.	J. Hughes.	Cited by J. J. H. Teall, Brit. Petrol., p. 228, 1888.	Lava.	In W. T., p. 291.
76	Eycott Hill, Lake District, England.	J. Hughes.	Cited by J. J. H. Teall, Brit. Petrol., p. 228, 1888.	Lava.	In W. T., p. 291.
77	Killerton, Devonshire, England.	E. Haworth.	B. Hobson, Q. J. G. S., XLVIII, p. 507, 1892.	Andesite.	In W. T., p. 423.
78	Carn Boduan, Caernarvonshire, Wales.	E. H. Acton.	H. Harker, Bala Vol. Ser., p. 69, 1889.	Andesite.	In W. T., p. 423.
79	Longmynd, Wales.	Not stated.	Reade and Holland, Pr. Liv. G. Soc., X, Table IV, 1908.	Andesite tuff.	H ₂ O includes loss.
80	Espinasse, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Andesite.	
81	Fourneaux, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Andesite.	
82	Viaguin, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 329, 1902.	Andesite.	
83	Lioran, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 332, 1902.	Andesite.	
84	Sévérac, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 337, 1902.	Andesite.	
85	Fraisse-haut, La Bourgade, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 333, 1902.	Andesite.	
86	Near Clermain, Maconnaïs, France.	Not stated.	Michel-Levy and Lacroix, B. Sv. Ct. G. Fr., VII, No. 45, p. 7, 1895.	Porphyrite.	Not in W. T.
87	Boulevie, Esterel, France.	Rüst.	A. Michel-Levy, B. Sv. Ct. G. Fr., IX, No. 57, p. 19, 1897.	Esterellite.	In W. T., p. 423.
88	La Touchque, Esterel, France.	Rüst.	A. Michel-Levy, B. Sv. Ct. G. Fr., IX, No. 57, p. 21, 1897.	Esterellite.	In W. T., p. 423.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
89 C4. V	61.58	18.84	4.68	n. d.	2.04	6.59	4.27	1.49	1.61			0.27	trace		101.37	
90 D4. V	59.50	18.49	6.38	n. d.	2.15	5.65	4.19	1.69	3.57			0.35			101.97	
91 C4. V	57.63	18.43	4.59	n. d.	2.38	7.18	3.92	1.30	5.20			0.28	trace		100.91	
92 D4. V	43.66	26.79	5.81	n. d.	5.80	15.64	1.97	0.55	1.76			0.44			102.42	
93 C3. V	51.7	20.7	2.2	5.5	3.8	9.9	2.1	0.4	3.8						100.1	
94 C3. V	51.61	19.31	trace	8.93	4.35	3.83	5.37	1.90	3.12		2.17	0.64			101.23	
95 D4. V	62.02	21.65	1.22	trace	2.70	4.40	6.90	1.10	1.60						101.59	
96 D3. V	55.01	15.69	4.78	5.79	6.20	11.21	1.19	1.55	0.65						102.07	2.837
97 C3. V	54.26	15.93	6.80	5.53	3.35	11.32	1.94	1.10	0.99				0.27		101.49	2.770
98 C3. V	53.13	15.61	2.33	8.23	5.80	11.75	1.86	1.78	0.73						101.22	2.555
99 C2. IV	57.19	16.27	6.85	0.70	2.28	4.89	6.08	4.79	n. d.		0.32	0.09			99.46	
100 C4. V	57.73	19.26	8.00	n. d.	0.14	4.22	6.78	4.68	2.50			trace	trace		100.31	2.739
101 B4. V	55.50	19.81	2.47	n. d.	0.95	1.13	8.51	5.72	3.99	0.41		0.21	1.22		99.92	
102 C4. V	52.27	19.27	n. d.	8.82	3.18	5.86	3.44	4.69			2.47				100.00	
103 C4. V	62.54	23.56			1.15	4.75	3.16	2.43	1.75						99.35	2.694
104 C4. V	62.30	17.45	5.50	n. d.	1.21	4.20	2.95	2.90	2.70						99.21	2.595
105 B4. V	63.92	21.09	n. d.	3.88	0.72	4.61	1.04	2.86	1.50				trace		99.62	
106 B4. V	54.20	19.72	n. d.	10.49	2.46	9.40	2.05	0.64	0.68						99.64	
107 B4. V	53.99	24.27	n. d.	7.35	2.39	9.23	1.59	0.75	0.55						100.10	
108 B4. V	56.65	22.11	3.31	n. d.	3.42	6.67	4.10	1.86	2.20			trace	0.16		100.48	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
89	Dramont, Esterel, France.	Rüst.	A. Michel-Levy, B. Sv. Ct. G. Fr., IX, No. 57, p. 19, 1897.	Esterellite.	In W. T., p. 423.
90	Dramont, Esterel, France.	Rüst.	A. Michel-Levy, B. Sv. Ct. G. Fr., IX, No. 57, p. 21, 1897.	Esterellite.	In W. T., p. 425.
91	Les Cours, Esterel, France.	Rüst.	A. Michel-Levy, B. Sv. Ct. G. Fr., IX, No. 57, p. 19, 1897.	Esterellite.	In W. T., p. 425.
92	Dramont, Esterel, France.	Rüst.	A. Michel-Levy, B. Sv. Ct. G. Fr., IX, No. 57, p. 36, 1897.	Inclusion in esterellite.	In W. T., p. 433.
93	Pic du Midi d'Ossan, Pyrenees.	Not stated.	J. de Lapparent, B. Soc. M. Fr., XXXIV, p. 284, 1911.	Andesite.	
94	L'Arbizon, Pyrenees.	Pisani.	A. de Romeu, B. Soc. M. Fr., XXX, p. 179, 1907.	Andesite.	
95	Locality not stated. Northwestern Corsica.	J. Deprat.	J. Deprat, B. Sv. Ct. G. Fr., XVII, No. 167, p. 54, 1907.	Trachy- andesite.	
96	Alboran Island, Spain.	H. Graber.	F. Becke, T. M. P. M., XVIII, p. 544, 1899.	Alboranite.	In W. T., p. 425.
97	Alboran Island, Spain.	H. Graber.	F. Becke, T. M. P. M., XVIII, p. 544, 1899.	Alboranite.	In W. T., p. 425.
98	Isla de la Nube, Alboran Island, Spain.	H. Graber.	F. Becke, T. M. P. M., XVIII, p. 544, 1899.	Alboranite.	In W. T., p. 425.
99	Brüngelsberg, Siebengebirge.	Rössler.	H. Laspeyres, D. Siebengeb., p. 221, 1901.	Andesite.	
100	Löwenberg, Siebengebirge.	Deiters.	H. Laspeyres, D. Siebengeb., p. 185, 1901.	Andesite.	
101	Brohlthal, Iaacher See, Eifel.	K. Völzing.	K. Völzing, Jb. Pr. G. L.-A., XXVIII, p. 25, 1910.	Pumice.	
102	Horberig, Kaiserstuhl, Baden.	A. Knop.	A. Knop. D. Kaiserstuhl, p. 259, 1892.	Andesite.	2.27 H ₂ O and 3.13 CaCO ₃ deducted. In W. T., p. 425.
103	Hliniker Thal, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 467, 1887.	Andesite.	In W. T., p. 425.
104	Bohunitz, Hungary.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 467, 1887.	Andesite.	In W. T., p. 425.
105	Bujaker Wald, Czerhat, Hungary.	A. Kalecsinsky.	F. Schafarzik, Mt. Ung. G. A., IX, p. 301, 1895.	Andesite.	In W. T., p. 425.
106	Peleske, Czerhat, Hungary.	A. Kalecsinsky.	F. Schafarzik, Mt. Ung. G. A., IX, p. 258, 1895.	Andesite.	In W. T., p. 425.
107	Peleske, Czerhat, Hungary.	A. Kalecsinsky.	F. Schafarzik, Mt. Ung. G. A., IX, p. 258, 1895.	Andesite.	In W. T., p. 425.
108	Bulza, Kraso, Hungary.	K. Roka.	E. Pinkert, F. K., XXXVII, p. 296, 1907.	Hornblende andesite.	

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
109 B4. V	51.32	16.62	9.28	n. d.	5.36	9.62	2.96	2.15	2.60			0.25	0.55		100.71	
110 D2. V	62.46	16.07	1.67	3.26	1.56	3.10	4.18	3.75	1.57		0.52	0.62	0.11		98.87	
111 B3. IV	59.73	16.79	1.44	3.21	1.47	3.27	4.31	6.09	3.93				0.17		100.31	
112 B3. IV	55.23	14.06	5.06	4.12	4.00	9.34	2.07	2.43	1.07			1.33	0.57	SO ₃ Cl 0.84 trace	100.12	
113 B3. IV	53.63	14.17	1.46	8.07	7.05	8.52	1.80	2.03	2.01			0.93	trace	SO ₃ Cl 0.62 trace	100.29	2.789
114 B3. IV	60.39	16.96	1.50	3.42	3.81	5.41	3.37	2.01	3.03		(0.21)	trace		Cl trace	99.11	2.580
115 D3. V	59.06	16.40	2.88	4.18	2.63	4.32	5.29	1.49	2.06			trace		Cl trace	98.31	2.606
116 B3. IV	56.42	16.81	3.26	6.92	3.50	5.64	1.21	3.07	2.25			1.08	0.23		100.39	2.625
117 B3. IV	59.55	18.08	2.15	3.13	1.40	9.36	1.53	2.06	2.27			0.39	0.24	SO ₃ Cl 0.35 trace	100.51	
118 B3. IV	57.69	17.43	0.94	4.09	4.80	7.18	1.69	3.06	2.83			0.43	0.18	SO ₃ trace	100.32	
119 B3. IV	58.78	16.97	1.13	2.10	1.46	7.27	3.67	4.18	3.60			0.32	0.17	SO ₃ 0.44	100.09	
120 B3. IV	53.82	16.19	4.30	3.26	7.02	7.28	1.70	6.28	0.10						99.95	2.78
121 B4. V	69.52	13.12	5.27	n.d.	0.47	7.18	2.06	1.08	0.42			1.46	0.17		100.75	
122 B4. V	68.85	13.02	2.67	n. d.	1.57	4.72	1.90	1.80	3.03			1.36	0.21	SO ₃ Cl 1.04 trace	100.17	
123 B4. V	67.38	15.46	3.66	n. d.	1.03	4.72	4.98	2.14	0.41			0.04	0.29		100.11	
124 C3. V	66.99	17.56	1.41	3.39	0.93	4.25	3.35	0.34	1.53			trace	trace		99.75	
125 B4. V	66.83	11.79	7.86	n. d.	0.80	2.52	5.54	3.81	0.64						99.79	
126 B4. V	62.26	12.35	9.79	n. d.	0.67	3.62	5.58	4.40	0.58						99.25	
127 D4. V	63.85	13.14	9.39	n. d.	0.56	4.00	6.13	4.08	0.30						101.45	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
109	Bulza, Krasso, Hungary.	K. Roka.	E. Pinkert, F. K., XXXVII, p. 292, 1907.	Olivine-augite andesite.	
110	Cattajo, Euganean Hills, Italy.	M. Stark.	M. Stark, T. M. P. M., XXV, p. 327, 1906.	Hypersthene andesite.	
111	Monte Amiata, Tuscany.	L. Ricciardi.	A. Verri, B. Soc. G. It., VIII, p. 408, 1889.	Andesite.	In W. T., p. 259.
112	Radiconani, Tuscany.	L. Ricciardi.	G. Mercalli, At. Soc. It. Mil., XXX, p. 375, 1897.	Andesite.	In W. T., p. 231. Cf. No. 56, II.5.3.3.
113	Radiconfani, Tuscany.	L. Ricciardi.	G. Mercalli, At. Soc. It. Mil., XXX, p. 371, 1897.	Andesite.	In W. T., p. 329. Cf. No. 57, II.5.3.3.
114	Monté Patello, Capraia Island.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 141, 1893.	Andesite.	In W. T., p. 243.
115	Punta della Manza, Capraia Island.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 142, 1893.	Andesite.	In W. T., p. 425.
116	Monte Rado, near Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, N. J. B. B., VI, p. 33, 1889.	Andesite.	In W. T., p. 247.
117	Monte Cimino, near Viterbo, Italy.	L. Ricciardi.	A. Verri, B. Soc. G. It., VIII, p. 403, 1889.	Andesite.	In W. T., p. 247.
118	Monte Cimino, near Viterbo, Italy.	L. Ricciardi.	A. Verri, B. Soc. G. It., VIII, p. 403, 1889.	Andesite.	In W. T., p. 247.
119	Bagnaia, near Viterbo, Italy.	L. Ricciardi.	G. Mercalli, Mem. Ac. Linc., XX, p. 12, 1903.	"Peperino" (latite).	
120	San Loreto, Monte Cimino, near Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Oligoclasite, (ciminite).	
121	Lava of 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	In W. T., p. 427.
122	Eruption of August, 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 112., 1892.	Andesite ash.	In W. T., p. 427.
123	Bomb of 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 107, 1892.	Andesite.	In W. T., p. 227.
124	Bomb of 1888, Vulcano, Aeolian Islands.	L. Kahlenberg.	W. H. Hobbs, B. G. S. A., V p. 601, 1894.	Vulcanite.	Alkalies incorrect. Cf. No. 325. I.4.2.3. In W. T., p. 143.
125	Eruption of 1889, Vulcano, Aeolian Islands.	Silvestri (?)	Silvestri and Mercalli, Ann. Uff. Met. It., X (IV), p. 235, 1891.	Andesite.	Interior of bomb Not in W. T.
126	Eruption of 1889, Vulcano, Aeolian Islands.	Silvestri (?)	Silvestri and Mercalli, Ann. Uff. Met. It., X (IV), p. 235, 1891.	Andesite.	Crust of bomb, Not in W. T.
127	Bomb of 1889, Vulcano, Aeolian Islands.	Not stated.	Silvestri and Mercalli, Ann. Uff. Met. It., X (IV), p. 235, 1891.	Andesite.	Not in W. T.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
128 B4. V	63.44	12.88	7.64	n. d.	2.45	6.04	4.02	3.09	0.31			0.16	0.29	SO ₃ Cl trace	100.32	
129 C3. V	63.27	12.34	7.32	n. d.	3.99	8.06	1.29	2.67	0.30			0.23	0.34	SO ₃ Cl 0.41 0.08	100.36	
130 D4. V	62.94	13.96	7.61	n. d.	0.59	2.08	5.42	3.64	0.55						97.79	
131 C3. V	62.42	17.15	1.02	5.91	2.14	6.39	2.09	1.21	0.53			1.45	0.29		100.60	
132 C3. V	60.50	15.05	1.43	6.07	3.11	8.61	1.83	2.02	0.21			1.12	0.34		100.29	
133 C3. V	58.05	12.06	8.42	n. d.	3.62	8.76	1.46	2.38	1.42			1.12	0.44	SO ₃ Cl 0.21 2.42	100.30	
134 A4. IV	62.20	15.40	7.74	n. d.	2.09	5.95	3.25	2.45	0.13	0.13		0.46			99.80	
135 A4. IV	57.38	18.13	9.23	n. d.	1.93	8.50	2.44	1.36	0.41	0.20		0.34			99.92	
136 A4. IV	57.60	14.71	8.55	n. d.	4.98	7.54	3.46	1.87	0.73	0.05		0.82			100.31	
137 C3. V	61.47	18.09	5.14	3.06	1.32	3.00	5.85	2.83	n. d.						100.76	
138 D3. V	60.24	20.28	2.32	3.88	0.50	1.96	7.80	4.28	n. d.						101.26	
139 C3. V	61.43	17.51	5.11	2.30	0.54	2.45	6.22	3.95	n. d.						99.51	2.34
140 C3. V	51.37	23.71	1.01	3.01	4.06	9.76	2.53	1.81	0.70		1.12		1.65		100.82	
141 C4. V	73.73	14.77			0.94	1.93	3.27	2.75	1.76						99.15	
142 C4. V	71.05	17.61			trace	4.45	3.04	2.56	1.42						100.13	
143 C4. V	68.00		17.91		trace	5.63	3.35	2.58	2.60						100.07	
144 C4. V	58.42	18.08	5.30	n. d.	1.78	6.15	3.46	0.91	5.31		1.03				100.44	2.620
145 B4. V	60.95	16.42	7.02	n. d.	2.05	6.99	3.35	0.83	2.20		0.80				100.59	2.74
146 D4. V	58.35	24.92			0.77	2.31	6.47	3.55	1.66						99.00	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
128	Eruption of November, 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 112, 1892.	Andesite ash.	In W. T., p. 427.
129	Eruption of September, 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 112, 1892.	Andesite ash.	In W. T., p. 427.
130	Bomb of 1889, Vulcano, Aeolian Islands.	Not stated.	Silvestri and Mercalli, Ann. Uff. Met. It., X (IV), p. 235, 1891.	Andesite.	Not in W. T.
131	Lava of 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	In W. T., p. 249.
132	Lava of 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 110, 1892.	Andesite.	In W. T., p. 247.
133	Eruption of 1888, Vulcano, Aeolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 112, 1892.	Andesite ash.	In W. T., p. 427.
134	Capo Graziano, Filicudi, Aeolian Islands.	F. Glaser.	A. Bergeat, Abh. Bay. Ak. W., XX, p. 214, 1899.	Cordierite andesite.	In W. T., p. 425.
135	Filicudi, Aeolian Islands.	F. Glaser.	A. Bergeat, Abh. Bay. Ak. W., XX, p. 208, 1899.	Andesite.	In W. T., p. 425.
136	Alicudi, Aeolian Islands.	F. Glaser.	A. Bergeat, Abh. Bay. Ak. W., XX, p. 219, 1899.	Andesite.	In W. T., p. 425.
137	Montagna Grande, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 155, 1884.	Andesite.	Cf. No. 35, I. 5.1.4. Cf. J. G., XXII, p. 19, 1914. In W. T., p. 203.
138	Montagna Grande, Pantelleria.	E. Maegis.	H. Foerstner, Z. K., VIII, p. 155, 1884.	Andesite.	Cf. as above. In W. T., p. 203.
139	Porto Scauri, Pantelleria.	H. Foerstner.	H. Foerstner, Z. K., VIII, p. 164, 1884.	Andesite.	Cf. as above. In W. T., p. 203.
140	Pala Manteda, Florinas, Sardinia.	F. Millosevitch.	F. Millosevitch, Mem. Ac. Linc. (5), VIII, No. 15, p. 616, 1911.	Augite andesite.	
141	Kara Dag, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXI, p. 13, 1897.	Pyroxene andesite.	In W. T., p. 427.
142	Kara Dag, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXI, p. 13, 1897.	Pyroxene andesite.	In W. T., p. 427.
143	Kara Dag, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXI, p. 13, 1897.	Pyroxene andesite.	In W. T., p. 427.
144	Kara Dag, Crimea.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 473, 1887.	Andesite.	In W. T., p. 427.
145	Bujuk Uragi, Crimea.	R. Prendel.	R. Prendel, Ref., N. J., II, p. 97, 1887.	(Andesite.)	In W. T., p. 427.
146	Near Kara Dag, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int., VII, Guide XXXI, p. 13, 1897.	Pyroxene andesite.	In W. T., p. 427.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
147 B4. V	69.87	17.26	2.29	n. d.	0.08	2.82	4.52	1.92	0.76	0.22		0.26	0.02		100.00	
148 B4. V	65.74	18.76	4.18	n. d.	1.90	2.89	4.52	1.64	0.24	0.10		trace	0.02		100.00	
149 B4. V	57.01	19.02	n. d.	5.82	5.47	6.92	4.49	1.63	0.20						100.56	
150 B4. V	56.99	19.58	n. d.	5.44	5.34	6.80	3.36	1.79	0.13						99.43	
151 C3. V	52.43	25.44	2.98	1.90	2.36	2.95	6.90	1.48	2.59	0.92		0.04	0.02		100.00	
152 B3. IV	63.52	13.99	2.02	0.21	1.20	4.26	0.93	2.29	7.56	3.80	0.11	0.12			100.00	
153 C3. V	51.73	21.41	6.06	0.43	1.72	2.09	6.82	1.61	n. d.			0.12			100.00	
154 C3. V	51.23	22.33	5.74	0.15	1.75	4.23	3.60	4.63	5.57	2.41		0.16	0.01		100.00	
155 B3. IV	62.99	18.69	2.36	2.20	1.59	3.71	4.18	2.38	1.09	0.64		0.13	0.06		100.00	
156 C3. V	59.12	20.34	5.52	0.51	3.38	3.44	4.14	2.81	0.41	0.14		0.19			100.00	
157 C3. V	59.10	20.48	4.76	0.20	2.97	5.23	4.88	0.85	0.20	0.33		0.20	0.20		100.00	
158 ^a C3. V	58.59	21.29	4.74	0.71	2.49	6.36	4.42	0.94	0.27	0.04		0.19	0.18		100.00	
159 D3. V	55.49	10.45	6.81	0.63	6.10	17.11	0.96	0.69	0.91	0.68	0.10	0.04	0.02		100.00	
160 C4. V	58.80	17.70	6.77	n. d.	3.54	5.83	2.70	2.60	2.80						100.74	
161 C4. V	61.40	21.30	4.28	n. d.	2.24	3.67	3.11	2.55	2.40						100.95	
162 C4. V	61.00	20.80	4.37	n. d.	2.56	4.50	3.27	2.15	2.30						100.95	
163 B3. IV	59.93	16.99	3.58	1.28	1.51	5.92	3.23	1.55	4.28		0.96			Cl trace	99.23	2.327

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
147	Achatia Mta Caucasus.	C. Schmidt.	H. Abich, G. Armen., II, p. 158, 1888.	Quartz andesite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
148	Keli, Caucasus.	C. Schmidt.	H. Abich, G. Armen., II, p. 158, 1888.	Augite andesite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
149	Mleti, Caucasus.	Loewinson-Lessing and Krikmeyer.	Loewinson-Lessing, Ref., N. J., II, p. 237, 1899.	Andesite.	In W. T., p. 427.
150	Mleti, Caucasus.	Loewinson-Lessing and Krikmeyer.	Loewinson-Lessing, Ref., N. J., II, p. 237, 1899.	Andesite.	In W. T., p. 427.
151	Salalaki Valley, near Tiflis, Caucasus.	C. Schmidt.	H. Abich, G. Armen., II, p. 153, 1888.	Augite andesite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
152	Mzchetra Pass, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 154, 1888.	Andesite tuff.	SiO ₂ includes loss. 3 decimals. Not in W. T.
153	Mzchetra Pass, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 154, 1888.	Andesite tuff.	SiO ₂ includes loss. 3 decimals. Not in W. T.
154	Mzchetra Pass, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 153, 1888.	Trachyandesite tuff.	SiO ₂ includes loss. 3 decimals. Not in W. T.
155	Kipgöll, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 154, 1888.	Augite andesite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
156	Alagez, Ziaret, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 154, 1888.	Andesite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
157	Little Ararat, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 153, 1888.	Andesite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
158	Little Ararat, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 153, 1888.	Andesite fulgurite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
159	Arguri Valley, Greater Ararat, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 155, 1888.	Andesite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
160	Mount Phako, Lemnos Island, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 223, 1898.	Andesite.	Not in W. T.
161	Pithari, Mytilene Island, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 187, 1898.	Trachyandesite.	Not in W. T.
162	Mesotopos, Mytilene Island, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 187, 1898.	Trachyandesite.	Not in W. T.
163	Spasmeno Vouno Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende andesite.	Sp. gr. low. In W. T., p. 193.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
164 C3. V	55.87	22.40	2.52	1.80	2.99	9.20	1.80	0.39	2.66		0.16				99.79	2.268
165 C3. V	54.86	23.08	4.41	1.50	1.29	6.98	3.35	1.48	2.80		0.05				99.81	2.503
166 D3. V	56.1	20.4	2.3	3.0	6.5	8.6	2.7	0.9	n. d.		0.8				101.3	2.845
167 D4. V	73.2	13.8	2.4	n. d.	1.1	0.6	4.9	2.1	n. d.		3.2				101.3	
168 D3. V	70.7	16.3	0.1	0.2	0.4	1.6	7.2	3.5	n. d.						100.0	
169 B3. IV	68.71	18.19	1.20	2.25	0.52	3.61	4.23	1.34	n. d.		0.52				100.57	2.499
170 D3. V	64.6	18.7	2.1	4.1	1.5	2.8	4.7	1.5	n. d.						100.0	
171 D3. V	63.6	20.2	2.0	3.9	0.6	2.5	5.0	2.2	n. d.						100.0	
172 D3. V	60.9	21.6	1.9	2.4	1.5	4.2	4.6	2.9	n. d.						100.0	
173 D4. V	57.2	19.5	9.2	n. d.	3.1	5.7	5.2	0.1	n. d.						100.0	
174 D3. V	57.2	19.1	2.2	4.7	3.5	7.1	4.2	2.0	n. d.						100.0	
175 D3. V	56.3	18.5	2.7	3.3	5.5	9.4	3.6	0.7	n. d.						100.0	
176 D4. V	56.0	23.5	5.3	n. d.	2.6	6.7	5.5	0.4	n. d.						100.0	
177 D3. V	53.9	25.6	2.0	3.7	1.9	6.8	3.4	2.7	n. d.						100.0	
178 D3. V	52.4	21.3	4.2	4.5	3.9	11.8	1.8	0.1	n. d.						100.0	
179 D3. V	51.9	22.2	3.2	3.9	5.2	9.3	3.7	0.6	n. d.						100.0	2.764
180 D3. V	51.8	20.1	4.6	7.0	3.4	11.9	1.1	0.1	n. d.						100.0	
181 D3. V	51.7	22.4	3.4	4.0	4.3	10.4	3.4	0.4	n. d.						100.0	
182 D3. V	51.5	24.5	3.9	4.9	2.3	10.9	1.2	0.8	n. d.						100.0	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
164	Kakoperato, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende andesite.	Sp. gr. low. Segregation in No. 42, II. 4.2.4. In W. T., p. 251.
165	Stavro Vouno, Aegina, Greece.	A. Röhrig.	H. S. Washington, J. G., III, p. 150, 1895.	Hornblende andesite.	In W. T., p. 427.
166	Kaimeni? Methana, Greece.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 315, 1902.	Alboranite.	
167	Acrotiri, Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, Santorin, p. 365, 1879.	Trass.	Not in W. T.
168	Balos, Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 320, 1902.	Andesite perlite.	Calculated to 100.
169	Acrotiri, Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 318, 1902.	Andesite.	
170	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 302, 1902.	Santorinite.	Calculated to 100.
171	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 303, 1902.	Santorinite.	Calculated to 100.
172	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 304, 1902.	Santorinite.	Calculated to 100.
173	Balos, Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, Santorin, p. 343, 1879.	Lava.	Calculated to 100. Not in W. T.
174	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 305, 1902.	Lava.	Calculated to 100.
175	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 306, p. 1902.	Santorinite.	Calculated to 100.
176	Base of St. Elias, Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, Santorin, p. 334, 1879.	Anorthite lava.	Calculated to 100. Not in W. T.
177	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 307, 1902.	Santorinite.	Calculated to 100.
178	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 313, 1902.	Alboranite.	Calculated to 100.
179	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 312, 1902.	Alboranite.	Calculated to 100.
180	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 309, 1902.	Alboranite.	Calculated to 100.
181	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 310, 1902.	Alboranite.	Calculated to 100.
182	Thera, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 311, 1902.	Alboranite.	Calculated to 100.

-ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
183 C3. V	65.80	19.43	2.13	2.86	1.18	1.99	5.53	1.45	(0.42)		0.16				100.53	2.588
184 C3. V	59.15	20.50	4.50	5.52	0.93	2.25	6.52	1.04	n. d.		0.21				100.62	2.618
185 C3. V	57.08	20.35	2.31	5.75	1.39	9.04	3.82	0.72	n. d.		0.36				100.82	2.765
186 C3. V	68.02	16.73	1.90	4.04	0.92	2.33	4.90	0.92	n. d.		0.31				100.07	2.498
187 C3. V	64.97	19.52	0.95	3.05	1.26	4.61	5.04	0.93	(0.17)		0.16				100.49	2.553
188 C3. V	64.32	21.11	0.56	4.09	1.37	2.39	5.20	1.07	n. d.		0.69				100.80	2.581
189 C3. V	65.97	19.70	2.00	2.67	1.05	2.68	5.04	1.47	(0.06)		0.47				101.05	2.577
190 D3. V	71.0	16.8	0.3	0.5	0.7	0.8	7.4	2.0	n. d.		0.5				100.0	
191 D3. V	67.6	16.5	1.6	3.4	2.2	2.6	4.9	1.8	0.7						101.3	
192 D3. V	67.3	17.2	1.4	3.2	2.0	2.5	4.7	2.1	1.1						101.5	
193 D3. V	66.1	17.6	1.7	3.7	2.1	3.1	3.9	1.6	0.9						100.7	
194 C3. V	65.42	20.61	1.45	2.40	1.04	3.43	5.19	0.88	n. d.		0.26				100.68	2.496
195 D3. V	66.0	18.1	1.2	2.9	2.2	2.2	4.0	4.2	0.7						101.5	
196 C3. V	53.59	23.82	0.31	5.75	3.62	10.53	2.39	0.37	(0.51)		0.05				100.43	2.764
197 C3. V	66.40	19.05	1.20	4.15	1.20	3.40	4.50	1.25	n. d.						101.15	
198 C4. V	67.66	15.30	2.37	n. d.	1.53	4.95	3.68	2.69	2.90						101.08	
199 D3. V	56.70	19.57	2.96	1.70	3.34	6.17	3.59	1.71	3.20						98.94	
200 D4. V	55.55	17.14	6.39	n. d.	3.30	6.78	2.88	3.87	1.76						97.67	
201 D3. V	46.20	14.75	9.67	0.75	6.07	9.53	4.43	1.39	2.40		2.28	0.45			97.92 (100.52)	
202 D4. V	57.16	20.06	2.84	1.95	1.55	4.41	5.84	4.52	1.09		2.67		trace		102.09	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
183	Therasia, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 298, 1902.	Santorinite.	Cf. No. 172, I.4.2.4.
184	Upper flow, Aspronisi, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 299, 1902.	Santorinite.	
185	Lower flow, Aspronisi, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 300, 1902.	Santorinite.	
186	Palaea Kaimeni, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 297, 1902.	Santorinite.	Cf. No. 173, I.4.2.4.
187	Palaea Kaimeni, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 296, 1902.	Santorinite.	Cf. No. 173, I.4.2.4.
188	Palaea Kaimeni, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 295, 1902.	Santorinite.	
189	Mikra Kaimeni, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 293, 1902.	Santorinite.	
190	Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 316, 1902.	Santorinite pumice.	
191	Bomb of 1866, Giorgio Kaimeni, Santorini, Aegean Sea.	H. Arsandaux.	H. Arsandaux, B. Soc. M. Fr., XXIV, p. 467, 1901.	Andesite.	
192	Bomb of 1868, Giorgio Kaimeni, Santorini, Aegean Sea.	H. Arsandaux.	H. Arsandaux, B. Soc. M. Fr., XXIV, p. 467, 1901.	Andesite.	Interior.
193	Bomb of 1868, Giorgio Kaimeni, Santorini, Aegean Sea.	H. Arsandaux.	H. Arsandaux, B. Soc. M. Fr., XXIV, p. 467, 1901.	Andesite.	Crust.
194	Bomb of 1868, Giorgio Kaimeni, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 292, 1902.	Santorinite.	Crust.
195	Bomb of 1867, Giorgio Kaimeni, Santorini, Aegean Sea.	H. Arsandaux.	H. Arsandaux, B. Soc. M. Fr., XXIV, p. 467, 1901.	Andesite.	
196	Giorgio Kaimeni, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 314, 1902.	Alboranite.	Inclusion in santorinite.
197	May Island, Santorini, Aegean Sea.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 286, 1902.	Santorinite.	
198	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 89, 1900.	Hornblende andesite.	In W. T., p. 427.
199	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 84, 1900.	Hypersthene andesite.	Mean of 3. In W. T., p. 427.
200	Cap Marsa, Menerville, Algeria.	Duparc and Pearce.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 84, 1900.	Hypersthene andesite.	Mean of 3. In W. T., p. 427.
201	Les Mamelles, Cap Verde, Senegal.	Pisani.	J. Chantard, C. R., CXLIII, p. 921, 1906.	Andesite.	Also in B. Soc. Gr. (4), VII, p. 437, 1907.
202	Nightingale Island, Tristan d'Acunha.	Klement.	A. Renard, Chall. Rep. Oc. Islds., p. 92, 1889.	Andesite tuff.	In W. T., p. 427.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
203 D4. V	64.54	19.16	7.23	n. d.	3.39	2.47	0.57	1.13	2.25		0.79				101.53	
204 A4. IV	55.67	16.06	10.89	n. d.	2.93	5.92	3.81	0.51	4.15			0.83			100.77	
205 B4. V	55.10	19.57	8.52	n. d.	2.01	5.90	3.67	4.77	1.19						100.73	
206 B4. V	60.12	18.25	5.43	n. d.	1.11	3.83	5.81	1.69	3.52						99.76	2.58
207 C3. V	54.80	22.31	2.47	4.33	3.28	7.08	4.47	1.03	0.30				trace		100.07 (100.77)	2.76
208 C2. IV	59.70	16.68	5.43	2.09	2.35	5.20	2.67	0.99	0.90			0.15	0.98	BO ₃ S 0.95 2.25	100.34	
209 C3. V	59.56	16.10	6.28	3.02	3.08	6.32	3.09	0.80	0.44			0.18	1.80		100.67	
210 B3. IV	57.32	22.67	1.28	5.61	5.43	0.12	3.89	1.35	2.60						100.67	
211 B3. IV	51.85	21.97	4.64	2.87	1.88	8.24	4.04	1.64	3.84						100.97	
212 B3. IV	51.34	21.21	1.75	9.16	2.56	9.92	3.22	0.25	0.85						100.26	
213 D4. V	54.66	14.79	8.59	n. d.	0.80	6.08	3.62	2.30	3.93			0.10	0.63	Cl S 0.29 3.16	98.95	
214 B3. V	49.89	20.01	1.75	9.16	3.58	10.45	4.17	0.42	0.80						100.23	
215 C3. V	61.28	18.16	5.97	1.76	0.79	3.55	5.51	2.75	1.72				trace		101.49	
216 B4. V	59.87	17.23	9.96	n. d.	0.77	2.96	6.21	2.92	0.61						100.53	
217 C3. V	50.87	21.98	5.85	5.09	1.38	9.12	2.85	0.22	0.43				1.45		99.24	
218 B4. V	54.44	12.90	7.08	n. d.	12.75	5.12	2.06	0.35	5.54						100.24	2.75
219 B4. V	53.18	16.18	10.30	n. d.	6.72	10.12	1.85	0.35	1.65						100.35	2.725
220 A4. IV	58.14	17.93	5.46	n. d.	2.61	7.63	4.08	2.16	1.76	0.10					99.87	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
203	Harrismith, Orange River Colony.	W. P. Jorissen.	G. A. F. Molengraaf, N. J., I, p. 82, 1894.	Cordierite vitrophyrite.	In W. T., p. 427.
204	Chemerin, Kushkek, Elburz Mountains, Persia.	E. Drasche.	E. Drasche, Vh. G. R.-A. Wien, p. 196, 1884.	Andesite.	In W. T., p. 427.
205	Buhemin, Elburz Mountains, Persia.	E. Drasche.	E. Drasche, Vh. G. R.-A. Wien, p. 196, 1884.	Andesite.	In W. T., p. 429.
206	Nikolaievsk,ka, Amur River, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 57.	Hornblende andesite.	
207	Kljutschewsk, Korjaka Volcano, Kamchatka.	Not stated.	K. Bogdanovitch, Pet. Mt., L, p. 173, 1904.	Augite andesite.	
208	Bandaian, Japan.	Shimidzu.	T. Wada, Mt. D. Ges. Ost.-As., V, p. 74, 1889.	Andesite ash.	Alkalies interchanged. Cf. N. J., 1890, II, p. 102. In W. T., p. 429.
209	Bandaian, Japan.	Shimidzu.	T. Wada, Mt. D. Ges. Ost.-As., V, p. 74, 1889.	Andesite.	Alkalies interchanged. Cf. N. J., 1890, II, p. 102. In W. T., p. 245.
210	Iwaonobori, Shiribeshi, Hokkaido, Japan.	Takamine.	B. G. Soc. Jap., 1885?	Andesite.	Not in W. T.
211	Kabashite, Oshima, Hokkaido, Japan.	Takamine.	B. G. Soc. Jap., 1885?	Andesite.	Not in W. T.
212	Usu, Iburi, Hokkaido, Japan.	Takamine.	B. G. Soc. Jap., 1885?	Andesite.	Not in W. T.
213	Kirishimayama, Kiu Shiu, Japan.	M. Fesca.	M. Fesca, Mt. D. Ges. Ost.-As., VI, p. 347, 1896.	Andesite ash.	Incorrect in N. J., 1897, I, p. 288. In W. T., p. 429.
214	Naiho, Etrof, Chishima, Japan.	Takamine.	B. G. Soc. Jap., 1885?	Andesite.	Not in W. T.
215	Sulphur Island, Japan.	J. Petersen.	J. Petersen, Jb. Hamb. W. Anst., VIII, p. 13, 1891.	Augite andesite.	In W. T., p. 429.
216	Sulphur Island, Japan.	J. Petersen.	J. Petersen, Jb. Hamb. W. Anst., VIII, p. 15, 1891.	Augite andesite.	In W. T., p. 429.
217	Miakeshima, Bonin Islands, Japan.	J. Petersen.	J. Petersen, Jb. Hamb. W. Anst., VIII, p. 50, 1891.	Mijakite.	In W. T. p. 429.
218	Miyanura, Chichishima, Bonin Islands, Japan.	Fukuda.	Y. Kikuchi, J. Coll. Sci. Jap., III, p. 73, 1890.	Andesite.	"Boninite" in Petersen, ref. above. In W. T., p. 429.
219	Kurose, Ootoshima, Bonin Islands, Japan.	Fukuda.	Y. Kikuchi, J. Coll. Sci. Jap., III, p. 73, 1890.	Andesite perlite.	"Boninite" in Petersen, ref. above. In W. T., p. 429.
220	Aroyroy, Masbate, Philippine Islands.	A. J. Cox.	A. J. Cox, Phil. J. Sci. (A), III, p. 404, 1908.	Andesite.	

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
221	56.55	22.34	1.87	n. d.	2.36	4.74	2.38	4.84	4.86	2.51					100.44	
A4. IV																
222	55.97	20.35	6.26	n. d.	3.40	7.92	3.52	2.48	0.38	0.33					100.61	
B4. V																
223	53.69	18.00	9.11	n. d.	4.59	8.64	3.07	1.63	1.08	0.31					100.12	
A4. IV																
224	63.9	17.8	3.7	0.4	1.4	4.2	4.2	3.4	0.2						99.2	
C3. V																
225	55.5	20.5	6.8	0.6	4.2	7.9	3.4	1.5	0.1						100.5	
C3. V																
226	61.42	15.21	2.43	1.88	1.19	8.34	5.53	1.90	0.97						98.87	2.585
D3. V																
227	60.66	17.86	2.21	4.01	1.59	6.38	0.67	4.43	2.46						100.87	2.712
B3. IV																
228	60.47	17.81	5.79	2.09	4.47	4.51	0.50	4.13	0.22		trace		0.94		100.93	2.722
B3. IV																
229	59.13	12.98	6.08	0.52	2.13	11.90	3.99	2.12	0.05						98.90	
D3. V																
230	56.00	22.8	4.2	0.2	1.8	6.5	6.1	1.6	1.0						100.2	
C3. V																
231	52.6	22.5	6.8	0.6	2.3	8.8	4.2	2.1	0.5						100.4	
C3. V																
232	58.2	20.4	4.6	0.3	3.0	7.7	3.2	2.0	0.4						99.8	
C3. V																
233	56.89	15.81	6.52	3.76	2.62	6.79	1.35	1.61	0.51				3.64		99.50	2.774
B3. IV																
234	53.77	15.01	5.07	3.07	1.97	16.50	3.99	1.26	0.17						100.81	2.779
B3. IV																
235	58.31	18.90	3.65	3.62	1.64	7.19	3.01	1.03	0.91				1.82		100.08	2.683
B3. IV																
236	57.84	18.40	6.22	2.41	3.33	8.19	0.89	2.61	0.86				0.23		100.98	2.736
B3. IV																
237	57.76	18.39	7.51	n. d.	3.34	6.21	3.63	2.61	0.94						100.89	2.664
B4. V																
238	69.4	15.9	1.2	2.2	1.1	3.4	4.2	2.3	1.0						100.7	
B3. IV																
239	62.10	23.90	2.16	1.01	0.19	4.09	4.10	2.10	n. d.		0.37				99.63	2.345
C3. V																
240	57.76	18.29	3.99	3.31	1.90	6.70	4.15	1.59	0.48		0.59				98.76	2.47
D3. V																

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
221	Guadalupe, near Manila, Luzon, Philippine Islands.	A. J. Cox.	A. J. Cox, Phil. J. Sci. (A), III, p. 404, 1908.	Andesite? tuff.	
222	Canlaon Volcano, Negros Island, Philippine Islands.	A. J. Cox.	A. J. Cox, Phil. J. Sci. (A), III, p. 404, 1908.	No name (andesite?).	
223	Canlaon Volcano, Negros Island, Philippine Islands.	A. J. Cox.	A. J. Cox, Phil. J. Sci. (A), III, p. 404, 1908.	No name (andesite?).	
224	Kaba Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 54, 1903.	Pyroxene andesite.	
225	Kaba Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 56, 1903.	Pyroxene andesite.	
226	Gunung Tiga, Sumatra.	A. Clausnitzer.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Hornblende andesite.	Not in W. T.
227	Apenberg, Sumatra.	J. J. Pennink.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Augite andesite.	Alkalies incorrect. Not in W. T.
228	Golgoeg, Talang Volcano, Sumatra.	J. G. Kramers.	R. D. M. Verbeek, Sum. Westk., p. 518, 1883.	Augite andesite.	Alkalies incorrect. Not in W. T.
229	Merapi Volcano, Sumatra.	A. Clausnitzer.	R. D. M. Verbeek, Sum. Westk., p. 518, 1883.	Augite andesite.	Bomb. Not in W. T.
230	Merapi Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 45, 1903.	Hornblende pyroxene andesite.	
231	Merapi Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 42, 1903.	Pyroxene andesite.	
232	Manindjan Volcano, Sumatra.	H. Hoppe.	H. Hoppe, In. Diss. Bres., p. 50, 1903.	Pyroxene andesite.	
233	Danan Paoeh, Limau Manias Volcano, Sumatra.	J. G. Kramers.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Augite andesite.	MnO high? Not in W. T.
234	Kotta Toea, Singalang Volcano, Sumatra.	A. Clausnitzer.	R. D. M. Verbeek, Sum. Westk., p. 518, 1883.	Augite andesite.	CaO and MgO? Not in W. T.
235	Pasar-Arbaa Volcano, Sumatra.	J. G. Kramers.	R. D. M. Verbeek, Sum. Westk., p. 518, 1883.	Augite andesite.	MnO high. Not in W. T.
236	Singkarah Volcano, Sumatra.	J. G. Kramers.	R. D. M. Verbeek, Sum. Westk., p. 518, 1883.	Augite andesite.	Alkalies? Not in W. T.
237	Eruption of 1876, Merapi Volcano, Java.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 467, 1887.	Andesite.	In W. T., p. 429.
238	Eruption of 1883, Krakatoa.	T. H. Waller.	J. W. Judd, Erupt. Krak., p. 38, 1888.	Andesite pumice.	Not in W. T.
239	Tandjoeng Santigi, Sumbawa Island.	Tillmans.	G. Rack, N. J. B. B., XXXIV, p. 50, 1912.	Amphibole desite.	
240	Kawinda, Sumbawa Island.	Tillmans.	G. Rack, N. J. B. B., XXXIV, p. 56, 1912.	Biotite-augite andesite.	

ANDESITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
241 D3. V	48.25	19.76	5.77	6.11	3.28	10.26	2.79	1.64	2.92		0.94				101.62	2.78
242 D4. V	60.94	17.80	n. d.	5.20	2.33	3.35	(2.77)	(2.46)	3.21						98.06	2.524
243 C3. V	80.76	9.71	0.40	0.36	0.32	2.07	3.46	1.40	0.31		0.92				99.70	2.61
244 D3. V	60.34	15.58	4.24	2.66	2.39	5.45	3.24	1.37	0.69		0.93				96.89	2.71
245 D3. V	49.70	14.70	5.28	7.98	3.24	9.30	3.53	0.51	1.06		2.18				97.38	2.94
246 D3. V	49.26	18.30	4.95	5.89	1.36	8.83	4.01	0.70	2.57		1.31				97.18	2.77
247 C2. IV	55.20	20.14	3.55	3.46	1.10	9.17	4.80	0.96	1.25	0.10	1.17	trace	0.09	CO ₂ none	100.99	
248 C3. V	64.49	14.26	3.91	3.28	1.25	3.67	6.60	0.40	1.22						99.08	
249 B2. III	57.60	20.35	4.24	2.39	1.61	7.06	3.55	1.88	0.65		0.73		0.24		100.30	
250 B2. III	56.60	20.61	3.13	2.30	1.52	5.81	2.08	4.59	2.20		1.20		0.09		100.13	
251 D4. V	52.60	18.30	12.70	n. d.	4.65	11.05	0.67	0.09	n. d.			0.06			100.12	
252 D4. V	51.35	18.20	14.50	n. d.	3.10	10.26	0.84	0.16	0.25			0.13		SO ₃ 0.41 Cl 0.05	99.25	
253 D4. V	50.90	20.00	14.10	n. d.	2.77	10.38	0.70	0.14	n. d.			0.16		SO ₃ 0.22 Cl 0.04	99.41	
254 D4. V	55.12	20.41	7.74	n. d.	2.75	5.35	3.80	2.50	3.13						100.80	
255 B2. IV	50.53	20.18	0.64	5.54	3.39	8.75	2.45	0.61	6.71		1.02		0.18	BaO none	100.00	
256 C3. V	57.47	19.20	3.83	3.22	0.49	9.35	2.47	1.36	0.39	0.12			0.97	SO ₃ 0.23	99.10	2.738
257 C4. V	56.57	17.82	2.91	2.65	trace	5.11	3.09	2.61	5.98	2.03			0.84		99.61	2.359
258 C4. V	57.04	19.51	5.50	2.71	none	8.16	2.83	2.38	0.20				2.05		100.38	2.720
259 C4. V	56.76	21.10	4.52	3.02	trace	9.01	2.80	3.27	0.24				trace		100.72	2.666
260 B4. V	60.95	15.97	9.08	n. d.	1.40	2.92	2.34	1.61	4.95						99.22	

ANDESITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
241	Doro Kompo, Sumbawa Island.	Tillmans.	G. Rack, N. J. B. B., XXXIV, p. 62, 1912.	Labrador-andesite (basalt).	
242	Mount Touna, Hiton, Ambon Island.	E. C. Lieber.	R. D. M. Verbeek, Jb. Mijnw., XXXIV, p. 231, 1905.	Ambonite (bronzite andesite).	French edition, p. 244. Alkalies cor- rected, p. 245.
243	Langa-weka River, Flores Island.	Tillmans.	G. Rack, N. J. B. B., XXXIV, p. 77, 1912.	Augite andesite.	"Silicified."
244	Ndoera River, Flores Island.	Tillmans.	G. Rack, N. J. B. B., XXXIV, p. 79, 1912.	Pyroxene andesite.	Sum low?
245	Manoe-Bola River, Flores Island.	Tillmans.	G. Rack, N. J. B. B., XXXIV, p. 76, 1912.	Augite andesite.	
246	Ota-weka River, Flores Island.	Tillmans.	G. Rack, M. J. B. B., XXXIV, p. 77, 1912.	Augite andesite.	
247	Pokolbin, New South Wales.	Not stated.	Browne and Walkom, Fr. R. Soc. N. S. W., p. 403, 1911.	Andesite.	
248	White Island, New Zealand.	W. A. McLeod.	W. A. McLeod, Tr. N. Z. Inst., XXXI, p. 488, 1899.	Hypersthene andesite.	Alkalies? In W. T., p. 227.
249	Sentry Hill, New Plymouth, Taranaki, New Zealand.	J. S. MacLaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Andesite?	Al ₂ O ₃ and MgO.
250	Inglewood, New Plymouth, Taranaki, New Zealand.	J. S. MacLaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Andesite?	Al ₂ O ₃ and MgO.
251	Rotoehu, Tarawera, New Zealand.	J. A. Pond.	S. P. Smith, Erupt. Taraw., p. 76, 1887.	Lapilli (andesite?).	Alkalies and CaO? In W. T., p. 429.
252	Pareheru, Tarawera, New Zealand.	J. A. Pond.	S. P. Smith, Erupt. Taraw., p. 76, 1887.	Lapilli (andesite?).	Alkalies and CaO? In W. T., p. 429.
253	Wairoa, Tarawera, New Zealand.	J. A. Pond.	S. P. Smith, Erupt. Taraw., p. 76, 1887.	Andesite lapilli.	Alkalies and CaO? In W. T., p. 431.
254	Port Hills, Christ Church, Banks Peninsula, New Zealand.	R. Speight.	R. Speight, Tr. N. Z. Inst., XXV, p. 369, 1893.	Olivine andesite.	"Best of 4 bad analyses." In W. T., p. 431.
255	Thames, Hauraki, Auckland, New Zealand.	J. S. MacLaurin.	C. Fraser, N. Z. G. S. B. 10, p. 24, 1910.	Hornblende- pyroxene andesite.	Calculated to 100.
256	Volcano, New Britain, Bismarck Archipelago.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XVI, p. 50, 1883.	Lava (andesite?).	Al ₂ O ₃ and MgO. In W. T., p. 251.
257	New Britain, Bismarck Archipelago.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XVI, p. 50, 1883.	Pumice (andesite?).	Al ₂ O ₃ and MgO. In W. T., p. 429.
258	Tanna Island, New Hebrides.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XX, p. 236, 1887.	Lava (andesite?).	Al ₂ O ₃ and MgO? MnO high. In W. T., p. 429.
259	Tanna Island, New Hebrides.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XX, p. 237, 1887.	Lava (andesite?).	In W. T., p. 429.
260	Lat. 35° 41' N., Long. 157° 42' E., South Pacific Ocean.	A. F. Renard.	Murray and Renard, Chall. Rep., Deep Sea Dep., p. 296, 1891.	Andesite pumice.	Dredged block. Not in W. T.

LAMPROPHYRES.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 B3. IV	52.29	19.38	4.40	6.00	3.54	7.79	2.12	4.12	0.95						100.59	
2 C3. V	53.69	25.86	n. d.	1.71	1.91	0.65	0.89	8.11	3.66			0.25		CO ₂ 0.11 F 0.07 FeS ₂ 1.89 BaO 0.37	99.17	
3 C4. V	58.99	9.79	10.07	4.96	2.30	6.74	3.78	3.81	n. d.				0.20		100.64	
4 D4. V	49.34	16.47	4.08	n. d.	3.54	12.13	4.53	4.35	(8.31)				0.25		100.00	
5 D4. V	47.2	19.7	2.4	n. d.	5.8	11.2	4.9	2.3	(7.7)						100.00	
6 B4. V	47.46	18.99	8.66	n. d.	8.78	5.41	1.72	5.67	3.37						100.06	
7 C3. V	59.87	21.23	4.04	3.34	2.62	1.20	1.14	3.62	2.75						99.81	
8 C3. V	59.26	9.21	6.91	1.69	3.57	12.02	1.88	2.31	1.34			trace	2.77	CO ₂ trace	100.96	
9 B3. IV	54.51	14.98	2.76	7.95	2.55	1.74	0.17	6.15	3.52	0.21	3.19	2.73	0.13		100.49	2.90
10 B3. IV	55.56	18.42	2.23	4.04	3.96	5.53	2.87	3.08	2.84		0.74	0.25			99.52	2.777
11 C3. V	63.30	18.60	2.33	1.35	1.66	3.76	3.45	1.76	5.00						101.21	
12 C3. V	52.30	17.45	1.80	4.80	8.50	4.78	2.12	3.23	3.70					CO ₂ 2.40	101.08	
13 D3. V	51.80	18.90	1.81	5.25	8.32	4.72	0.75	6.75	3.10						101.40	
14 D3. V	64.12	19.20	0.66	2.95	2.85	3.45	2.64	3.80	1.62						101.39	
15 D3. V	59.90	17.80	1.20	3.87	6.71	2.20	1.91	3.18	4.98						101.75	
16 C4. V	67.50	14.50	7.00	n. d.	2.30	1.10	3.38	3.38	1.60						100.76	
17 C4. V	66.04	13.30	8.40	n. d.	2.20	1.60	3.40	4.70	1.10						100.74	
18 C4. V	66.30	15.30	5.40	n. d.	2.60	0.90	2.80	4.60	1.20						99.10	
19 C2. IV	48.45	15.57	5.07	4.86	4.28	10.48	3.57	2.15	2.23		2.15	0.80		CO ₂ 1.57	101.18	
20 C4. V	43.84	15.30	17.16	n. d.	8.30	6.19	2.17	trace	4.80		1.72				99.48	

LAMPROPHYRES.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Blanche River, Swastika, Ontario.	E. L. Bruce.	E. L. Bruce. Sch. Min. Q., XXXV, p. 163, 1914.	Augite lamprophyre.	
2	Butte mine, Robinson District, Nevada.	H. Ross.	A. C. Lawson, B. Dep. G. Un. Cal., IV, p. 346, 1906.	Minette.	Altered.
3	Storrs, Ingleton, Yorkshire, England.	T. Tate.	A. Harker, The Naturalist, p. 153, 1899.	Mica lamprophyre.	Not in W. T.
4	Helm Gill, near Sedbergh, Yorkshire, England.	T. Tate.	A. Harker, The Naturalist, p. 153, 1899.	Mica lamprophyre.	H ₂ O=loss. Not in W. T.
5	Helm Gill, near Sedbergh, Yorkshire, England.	T. Tate.	A. Harker, The Naturalist, p. 153, 1899.	Mica lamprophyre.	Not in W. T.
6	Kapelle, near Weiler, Elsass.	G. Linck.	G. Linck, Abh. G. Kt. Els. Loth., III (I), p. 57, 1884.	Minette.	In W. T., p. 397.
7	Metzdorf, Erzgebirge.	R. Reinisch.	C. Gabert, Z. D. G. G., LIX, p. 348, 1907.	Mica trap.	
8	Walynkathal, Böhmerwald, Bohemia.	J. Mühlbauer.	J. N. and J. Woldrich, Arch. Landf. Böhm., XII (4), p. 65, 1904.	Minette.	
9	Fiz Chalchagn, Bernina District, Switzerland.	L. Hezner.	U. Grubenmann, pers. com.	Dark dike (minette?).	P ₂ O ₅ high.
10	Altgersdorf, near Aachen, Rheinland.	Linder.	E. Dathe, Jb. Pr. G. L.-A., XIX, p. CXXIX, 1899.	Vogesite.	Cf. No. 65, II.5.2.4. Not in W. T.
11	Hopital Camfront, Brittany.	Not stated.	C. Barrois, Cong. G. Int. VIII, Guide VII, p. 19, 1900.	Kersantite.	In W. T., p. 411.
12	Hopital Camfront, Brittany.	Not stated.	G. Barrois, Cong. G. Int. VIII, Guide VII, p. 19, 1900.	Kersantite.	In W. T., p. 411.
13	Hopital Camfront, Brittany.	Not stated.	C. Barrois, Cong. G. Int. VIII, Guide VII, p. 19, 1900.	Kersantite.	In W. T., p. 411.
14	Roche d'Agoux, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Kersantite.	
15	Espinasse, La Creuse, France.	Pisani.	L. de Launay, B. Sv. Ct. G. Fr., XI, No. 83, p. 77, 1902.	Kersantite.	
16	Croix de Fer, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Sv. Ct. G. Fr., VI, No. 40, p. 50, 1894.	Kersantite.	In W. T., p. 411.
17	Croix de Fer, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Sv. Ct. G. Fr., VI, No. 40, p. 50, 1894.	Kersantite.	In W. T., p. 413.
18	La Balme, Grandes Rousses, Dauphiny.	Fabre.	P. Termier, B. Sv. Ct. G. Fr., VI, No. 40, p. 50, 1894.	Kersantite.	In W. T., p. 413.
19	Stoitrenna, Gran, Norway.	V. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 81, 1899.	Kersantite.	In W. T., p. 413.
20	Rotmurg, Württemberg.	Not stated.	K. Regelman, Erl. G. Kt. Würt., Bl. 91, p. 39, 1907.	Kersantite.	Schliere in granite.

LAMPROPHYRES—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp.gr.
21 B3. IV	47.60	20.49	7.36	4.01	4.66	8.75	3.80	2.66	0.34						99.67	
22 B3. IV	47.49	20.13	3.88	6.04	5.62	8.70	5.13	2.43	0.56						99.98	
23 D3. V	56.95	17.70	2.73	4.22	4.80	6.58	2.93	3.33	1.48	0.29		0.59			101.73	2.76
24 B3. IV	63.08	15.61	2.38	2.55	2.48	1.90	4.77	3.54	1.90		1.24		1.17		100.72	
25 B4. V	60.52	16.99	8.07	n. d.	2.52	1.21	7.03	2.01	1.94					CO ₂ 0.40	100.69	
26 B3. IV	60.38	15.54	6.39	1.71	2.64	1.12	7.30	1.92	2.82					CO ₂ 0.48	100.30	
27 B3. IV	61.24	19.45	1.08	2.84	2.37	1.22	4.85	2.86	3.64		0.16		0.09		99.80	
28 B3. IV	56.38	14.83	2.85	1.53	2.84	6.78	3.16	3.08	5.94					CO ₂ 3.52	100.91	
29 B3. IV	60.52	17.73	2.08	2.75	5.27	1.10	3.96	3.08	3.38				trace	CO ₂ 0.02	99.89	
30 B4. V	59.68	15.65	7.22	n. d.	5.33	1.20	4.49	3.65	3.30				0.21		100.73	
31 B3. IV	53.44	16.19	2.80	5.49	6.76	2.24	4.17	3.51	3.57		1.60	0.31	0.16	CO ₂ 0.15	100.39	
32 D2. V	52.10	16.51	2.19	2.31	3.07	2.62	3.07	4.37	1.29	0.14	1.08	0.31		CO ₂ 0.25 SO ₃ 0.18	89.89 (98.84)	
33 C3. V	52.5	23.0	6.6	2.0	4.6	8.4	1.7	0.9	0.7						100.4	
34 B4. V	57.48	16.82	8.49	n. d.	4.64	5.45	2.63	4.57	0.25						100.33	
35 B4. V	56.77	20.02	6.40	n. d.	3.70	5.40	4.01	3.94	0.13						100.36	
36 C4. V	60.90	18.67	n. d.	5.38	1.48	4.70	2.90	2.27	1.90		0.80				99.00	
37 C3. V	56.75	20.58	0.53	6.11	2.73	4.82	4.65	0.90	1.78		1.15				100.00	
38 D3. V	49.00	23.22	1.37	8.51	2.95	4.25	3.29	2.08	2.35		1.60				98.62	
39 D3. V	61.90	17.20	1.90	2.71	2.82	4.44	3.82	2.90	2.89		trace	trace	trace	CO ₂ 0.92	101.50	
40 B3. IV	51.04	21.43	5.86	2.27	3.54	2.14	5.92	2.71	3.65	0.50	1.11				100.17	2.79

LAMPROPHYRES—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
21	Lastei da Monzoni, Monzoni, Tyrol.	J. A. Ippen.	J. A. Ippen, N. J. Cb., 1903, p. 637,	Kersantite.	
22	Monte Mulatto, Predazzo, Tyrol.	J. A. Ippen.	J. A. Ippen, N. J. Cb., 1904, p. 419,	Kersantite.	
23	Hospice, St. Gotthard, Switzerland.	K. M. Jene.	P. Waindizok, In. Diss. Zür., p. 34, 1906.	Kersantite.	Metamorphosed.
24	Herrnburg, Oberstauftenbach, Pfalz, Bavaria.	A. Schwager.	Schuster and Schwager, Geog. Jhft., XXII, p. 54, 1910.	Cuselite.	Series not satisfactory.
25	Herrnburg, Oberstauftenbach, Pfalz, Bavaria.	A. Schwager.	Schuster and Schwager, Geog. Jhft., XXII, p. 54, 1910.	Cuselite.	
26	Herrnburg, Oberstauftenbach, Pfalz, Bavaria.	A. Schwager.	Schuster and Schwager, Geog. Jhft., XXII, p. 54, 1910.	Cuselite.	
27	Rammelskopf, Pfalz, Bavaria.	S. Schwager.	Schuster and Schwager, Geog. Jhft., XXII, p. 53, 1910.	Cuselite.	
28	Rammelsbusch, near Ulmet, Pfalz, Bavaria.	A. Schwager.	Schuster and Schwager, Geog. Jhft., XXII, p. 55, 1910.	Cuselite.	Not fresh.
29	Remigiusberg, Pfalz, Bavaria.	A. Schwager.	Schuster and Schwager, Geog. Jhft., XXII, p. 53, 1910.	Cuselite.	
30	Remigiusberg, Pfalz, Bavaria.	A. Schwager.	Schuster and Schwager, Geog. Jhft., XXII, p. 53, 1910.	Cuselite.	
31	Hühnerkopf, Herschweiler, Pfalz, Bavaria.	A. Schwager.	Schuster and Schwager, Geog. Jhft., XXII, p. 55, 1910.	Cuselite.	
32	Strahlenberg, Schriesheim, Odenwald.	Stadler.	G. Klemm, Nb. Ver. Erdk. (4), XXVIII, p. 30, 1907.	Malchite.	Sum?
33	Niederarusdorf, Riesengebirge.	W. Herz.	L. Milch, N. J. Cb., p. 676, 1902.	Malchite.	
34	Passo di Campo, Adamello, Lombardy.	C. Riva.	C. Riva, At. Soc. It. Mil., XXVII, p. 265, 1897.	Malchite.	In W. T., p. 425.
35	Lago d'Arno, Adamello, Lombardy.	C. Riva.	C. Riva, At. Soc. It. Mil., XXVII, p. 265, 1897.	Malchite.	In W. T., p. 425.
36	Mergozzo, Lake Mergozzo, Piedmont.	F. Hinden.	H. Preiswerk, Rosenb. Fests., p. 326, 1906.	Mica malchite.	
37	Mergozzo, Lake Mergozzo, Piedmont.	F. Hinden.	H. Preiswerk, Rosenb. Fests., p. 326, 1906.	Malchite.	
38	Mergozzo, Lake Mergozzo, Piedmont.	F. Hinden.	H. Preiswerk, Rosenb. Fests., p. 326, 1906.	Malchite.	
39	Amba Chefut, Digsa, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 104, 1909.	Malchite.	Not fresh.
40	Sonnenberg, Verrucano, Switzerland.	L. Hezner?	R. Beder, In. Diss. Zür., p. 25, 1909.	Olivine weisel bergite.	

LAMPROPHYRES—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
41 C2. IV	47.93	20.19	3.51	6.69	5.83	7.88	2.61	1.79	1.68	0.17	0.74	0.10		CO ₂ 0.29 SO ₃ 0.42	99.83	
42 D3. V	50.9	25.5	2.6	6.7	1.3	10.5	1.7	0.7	0.2						100.1	
43 D3. V	46.93	11.83	7.58	6.03	12.28	13.26	3.12	0.44	0.92						102.39	
44 D4. V	41.00	21.36	13.44	n. d.	3.85	10.40	2.86	1.31	5.00						99.22	
45 C4. V	48.19	16.79	18.37	n. d.	1.32	6.85	5.59	1.11	2.31						100.53	
46 C4. V	44.85	17.20	11.20	n. d.	5.12	7.52	1.39	2.99	2.39		6.58		trace		99.58	
47 C4. V	43.50	17.02	13.68	n. d.	6.84	8.15	2.84	3.02	4.35						99.40	
48 D3. V	44.48	20.43	9.72	2.18	5.51	10.35	3.61	1.59	3.21		0.57				101.65	
49 D3. V	42.05	12.30	3.81	9.52	4.83	11.55	2.18	1.11	2.88		5.60			CO ₂ 2.68	98.51	
50 D3. V	41.40	13.28	6.54	8.63	5.26	10.05	2.43	0.75	3.17		2.75			CO ₂ 4.18	98.44	
51 D3. V	54.67	12.68	11.69	2.13	6.11	4.96	3.85	3.65	2.10						101.84	
52 D2. IV	45.53	18.37	4.85	3.43	4.11	8.15	3.93	4.16	2.62	1.68	1.50	0.86	0.72	CO ₂ 1.54	101.45	2.657
53 B3. IV	49.46	19.82	5.69	5.82	1.93	10.62	3.38	0.71	0.06		1.88			CO ₂ 0.31	99.68	
54 C3. V	49.40	20.71	3.04	3.62	5.28	8.27	5.64	1.39	1.98						99.33	
55 C2. IV	49.03	12.10	7.64	3.87	6.56	9.02	4.21	1.67	3.52		2.48	0.22	trace	CO ₂ 1.17	101.49	
56 C3. V	45.52	21.56	8.57	5.60	3.56	5.74	3.39	2.66	2.78						99.38	
57 D3. V	51.38	17.15	1.12	6.54	6.18	9.24	2.72	0.80	1.57	0.10	1.25			CO ₂ 0.84	98.99	
58 D3. V	47.40	20.14	0.58	6.64	6.34	7.78	2.76	2.65	2.98	0.12	1.54				98.93	
59 C3. V	55.95	19.47	4.09	1.08	4.24	7.84	2.64	3.78		1.60					100.69	

LAMPROPHYRES—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
41	Melibocus, Zwingenberg, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVIII, p. 30, 1907.	Orbite.	
42	Portrieux, Brittany.	Not stated.	J. de Lapparent, B. Soc. M. Fr., XXXIII, p. 265, 1910.	Beerbachite.	
43	Tilai-Kanjakowsky Mountains, Iow District, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 493, 1905.	Olivine beerbachite.	
44	Proctor, Vermont.	J. F. Kemp.	Kemp and Marsters, Am. G., IV, p. 101, 1889.	Camptonite.	Not fresh. In W. T., p. 417.
45	Forest of Dean, Orange County, New York.	J. F. Kemp.	J. F. Kemp, A. J. S., XXXV, p. 332, 1888.	Camptonite.	In W. T., p. 417.
46	Fort Montgomery, Hudson River, New York.	L. M. Dennis.	Kemp and Dennis, Am. Naturalist, 1888.	Camptonite.	In W. T., p. 417.
47	Fairhaven, Hampton County, New York.	J. F. Kemp.	Kemp and Marsters, Am. G., IV, p. 101, 1889.	Camptonite.	In W. T., p. 417.
48	Las Vegas, New Mexico.	G. A. Goodell.	I. H. Ogilvie, J. G., X, p. 506, 1902.	Camptonite.	
49	Esge, Brandberget, Gran, Norway.	L. Schmelck.	W. C. Brögger, Q. J. G. S., L, p. 26, 1894.	Camptonite.	Not fresh. In W. T., p. 417.
50	Hougen, Gran, Norway.	L. Schmelck.	W. C. Brögger, Eg. Kg., III, p. 60, 1899.	Camptonite.	Not fresh. In W. T., p. 417.
51	Waldmichelbach, Spessart, Bavaria.	E. Goller.	E. Goller, N. J. B. B., VI, p. 566, 1889.	Camptonite.	In W. T., p. 417.
52	Mädstein, Neschwitz, Bohemia.	F. Hanusch.	J. E. Hibsche, T. M. P. M., XIV, p. 103, 1894.	Camptonite.	Not fresh. In W. T., p. 301.
53	Ditro, Siebenbürgen, Hungary.	J. v. Szadeczky.	J. v. Szadeczky, Ref., N. J., 1901, I, p. 402.	Camptonite.	In W. T., p. 293.
54	Jasswa, Nijni Tagilsk, Ural Mountains.	Loewinson- Lessing.	Loewinson-Lessing, Vh. Rus. M. Ges. (2), XLIII, p. 556, 1905.	Camptovogesite.	
55	Mai Enda Maruglo, Adi Caieh, Eritrea.	E. Manasse.	E. Manasse, Stud. Pet. Erit., p. 108, 1909.	Camptonite.	
56	Siwo River, Witim Plateau, Lake Baikal, Siberia.	Not stated.	B. Polenow, Ref., N. J., 1902, I, p. 230.	Lamprophyre.	
57	Jacksonville, Oregon.	S. W. French.	A. N. Winchell, Min. Res. Oreg., I (5), p. 141, 1914.	Spessartite.	
58	Braden Mine, Jackson County, Oregon.	S. W. French.	A. N. Winchell, Min. Res. Oreg., I (5), p. 172, 1914.	Spessartite.	
59	Zahbelice, near Prague, Bohemia.	J. Nevole.	B. Macha, G. Cb., I, p. 513, 1901.	Spessartite.	Ref. N. J., 1902, I, p. 60. In W. T., p. 413.

GABBRO.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 D4. V	52.75	28.63			4.80	7.86	4.93	1.80	0.41			0.09	0.18	FeS ₂ 1.50	102.95	
2 D3. V	41.10	15.60	4.51	9.90	8.85	14.45	2.02	0.82	0.87		3.58				101.70	
3 D3. V	47.32	30.36	1.36	1.55	2.44	15.45	1.88	0.66	0.10					CO ₂ 0.58	101.69	2.73
4 C3. V	46.24	29.85	1.30	2.12	2.41	16.24	1.98	0.18	n. d.				trace	CO ₂ 1.03	101.35	2.85
5 B3. IV	40.61	25.90	2.18	5.37	7.69	14.50	2.31	0.25	0.78		0.65					
6 C4. V	65.65	16.84	n. d.	4.01	0.13	2.47	5.27	5.04	0.30						99.71	
7 C4. V	57.00	16.01	n. d.	10.30	1.62	6.20	4.35	3.53	0.15						99.16	
8 C3. V	54.72	17.79	2.08	6.03	5.85	6.84	3.02	3.01	n. d.						99.34	
9 B3. IV	46.85	18.00	6.16	8.76	8.43	10.17	2.19	0.09	0.30						100.95	3.097
10 D4. V	49.93	24.64	n. d.	2.74	2.43	6.27	2.20	3.80	1.20		6.01				99.22	
11 D4. V	49.30	22.46	12.04	n. d.	2.14	9.30	3.01	1.27	0.78						100.30	
12 D4. V	43.35	29.75	5.61	n. d.	2.03	12.46	trace	5.93	0.73						99.86	
13 D4. V	45.35	16.11	3.42	3.50	12.32	18.04	(1.26)								100.00	
14 D4. V	44.11	24.45	7.89	6.52	3.84	11.96	1.67	0.22	0.60			0.51	trace		101.27	3.044
15 D3. V	46.01	16.95	5.14	9.83	6.20	6.71	2.22	1.71	n. d.		2.48				97.25	
16 D2. V	45.30	11.81	9.94	9.31	8.09	8.05	0.93	4.07	2.70	0.30	1.15	0.80	0.84	CO ₂ SO ₃ 1.49 0.72	105.50	2.913
17 D4. V	64.04	2.11	2.81	22.14	4.04	0.60	0.30	0.11	0.67	3.73					100.55	
18 D4. V	58.94	2.72	3.01	22.94	4.74	0.71	0.24	0.09	3.35					CO ₂ 3.72	100.46	
19 D3. V	61.09	15.34	5.74	3.69	1.33	3.10	3.41	3.65	1.80						99.15	

GABBRO.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Cape Rutherford, Buchanan Bay, Ellesmere Land.	R. Schei.	C. Bügge, Rep. 2d Fram Exp., No. 22, p. 18, 1910.	Norite.	
2	Mount Royal, Montreal, Quebec.	A. Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 193, 1902.	Gabbro.	
3	South Sherbrooke, Ontario.	W. Lawson.	W. G. Miller, Rep. Bur. Min. Toronto, VIII (II), p. 227, 1899.	Corundum anorthosite.	Also in Am. G., XXIV, p. 280, 1899. In W. T., p. 207.
4	Seine River, Rainy Lake District, Ontario.	W. Lawson.	A. P. Coleman, Rep. Bur. Min. Toronto, V, p. 99, 1896.	Anorthosite.	Also in J. G., IV, p. 909, 1896. In W. T., p. 207.
5	Monhegan Island, Maine.	E. C. E. Lord.	E. C. E. Lord, A. G., XXVI, p. 340, 1900.	Olivine norite	In W. T., p. 435.
6	Harrisville, Adirondack Mountains, New York.	C. H. Smyth.	C. H. Smyth, B. G. S. A., VI, p. 274, 1895.	Gabbro.	In W. T., p. 199.
7	Natural Bridge, Adirondack Mountains, New York.	C. H. Smyth.	C. H. Smyth, B. G. S. A., VI, p. 274, 1895.	Gabbro.	In W. T., p. 431.
8	Salt Hill, near Peekskill, New York.	H. T. Vulté.	J. F. Kemp, Handb. of Rocks, p. 72, 1908.	Gabbro.	
9	Wilmurt Lake, Hamilton County, New York.	C. H. Smyth.	C. H. Smyth, A. J. S., XLVIII, p. 61, 1894.	Gabbro.	In W. T., p. 331.
10	Rosetown, near Stony Point, New York.	L. M. Dennis.	J. F. Kemp, A. J. S., XXXVI, p. 249, 1888.	Hornblende gabbro.	In W. T., p. 431.
11	Rosetown, near Stony Point, New York.	J. F. Kemp.	J. F. Kemp, A. J. S., XXXVI, p. 249, 1888.	Hornblende gabbro.	In W. T., p. 431.
12	Rosetown, near Stony Point, New York.	L. M. Dennis.	J. F. Kemp, A. J. S., XXXVI, p. 250, 1888.	Hornblende gabbro.	In W. T., p. 431.
13	Gwinns Falls, near Baltimore, Maryland.	W. S. Bayley.	G. H. Williams, U. S. G. S. B. 28, p. 37, 1886.	Hypersthene gabbro.	In W. T., p. 431.
14	Mount Hope, Baltimore, Maryland.	L. McCay.	G. H. Williams, U. S. G. S. B. 28, p. 37, 1886.	Hypersthene gabbro.	In W. T., p. 431.
15	Mount Bohemia, Michigan.	L. Kirschbaum.	A. C. Lane, Korng. Auvergn., p. 8, 1906.	Oligoclase gabbro.	Sum!
16	Mount Bohemia, Michigan.	N. Cook.	F. E. Wright, Mich. G. S. A. R. (1908), p. 369, 1908.	Oligoclase gabbro.	Sum!
17	Muscovado Lake Cook County, Minnesota.	A. D. Meeds.	N. H. Winchell, G. S. Minn. A. R. 23, p. 212, 1895.	Norite.	Igneous? Al ₂ O ₃ and iron oxides? In W. T., p. 435.
18	Muscovado Lake, Cook County, Minnesota.	A. D. Meeds.	N. H. Winchell, G. S. Minn. A. R. 23, p. 212, 1895.	Norite.	Igneous? Al ₂ O ₃ and iron oxides? In W. T., p. 435
19	Pigeon Point, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, G. S. Minn. B. 2, p. 82, 1887.	Gabbro.	In W. T., p. 223.

GABBRO—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp.gr.
20 D3. V	53.43	13.81	5.08	9.86	4.64	8.25	2.51	1.12	0.27				trace		98.97	
21 D4. V	50.43	23.83	17.63	n. d.	2.46	4.79	1.66	0.22			trace				101.02 (98.63)	
22 D3. V	49.42	24.47	3.13	6.13	1.00	8.45	4.98	1.15	0.55	0.06	1.87	0.04	0.11	S 0.11	101.48	
23 D3. v	35.81	14.32	7.38	15.25	10.49	17.23	2.06	0.37	5.25		2.30		0.18		100.62	3.08
24 C3. V	52.84	23.62	0.65	10.00	3.16	3.92	2.64	0.67	1.87		trace		0.43	BaO SrO none none	99.80	2.83
25 B3. IV	50.86	15.72	9.77	2.48	3.55	10.52	3.89	0.90	2.53						100.22	
26 C4. V	47.43	23.66	13.06	n. d.	3.15	11.21	0.15	0.20	0.90						99.76	
27 D4. V	47.40	29.74	n. d.	1.94	0.57	13.30	4.99	1.56	1.64						101.14	2.704
28 D4. V	65.17	21.04	0.74	n. d.	0.04	1.20	9.20	1.70	0.80		trace				99.89	
29 A4. IV	45.43	12.55	n. d.	6.50	13.41	12.39	1.71	0.11	2.74	2.41		0.04	0.21	CO ₂ SO ₃ Cl 2.35 0.24 trace	100.09	
30 D4. V	43.28	33.69			11.77		n. d.	n. d.	n. d.						100.76	
31 C4. V	40.08	22.86	n. d.	11.96	12.40	11.41	1.26	0.38	n. d.						100.35	
32 D4. V	53.46	13.35	n. d.	16.74	3.07	10.94	n. d.	n. d.	1.64					CO ₂ 0.80	100.00	
33 B4. V	50.78	17.16	3.15	7.61	7.16	10.28	2.61		1.20						99.59	2.82
34 D4. V	43.86	10.63	0.74	10.15	16.64	6.68	n. d.	n. d.	1.51						90.21	3.00
35 C2. IV	29.5	3.8	17.8	18.2	8.7	10.0	0.2	0.1	1.0		9.2		0.3	FeS ₂ 0.4	99.2	3.87
36 B3. IV	45.23	18.88	4.49	8.89	7.42	8.77	1.36	0.88	3.60		none	0.16			99.68	
37 B3. IV	43.84	24.64	3.97	6.73	4.95	10.24	2.58	0.99	1.83		0.27				100.33	
38 B3. IV	39.87	24.30	1.59	4.09	11.30	7.61	1.93	1.11	8.12						99.92	
39 D2. V	53.50	22.20	3.60	2.64	2.00	9.45	4.26	0.61	1.50		0.45		0.35		100.59	2.800

GABBRO—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
20	Wind Lake, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, G. S. Minn. B. 2, p. 97, 1887.	Gabbro.	In W. T., p. 431.
21	Duluth, Minnesota.	J. A. Dodge.	M. E. Wadsworth, G. S. Minn. B. 2, p. 75, 1887.	Gabbro.	In W. T., p. 431.
22	Duluth, Minnesota.	G. H. Stone.	F. F. Grout, J. G., XVIII, p. 656, 1910.	Gabbro.	
23	Duluth, Minnesota.	A. N. Winchell.	A. N. Winchell, Am. G., XXVI, p. 284, 1900.	Troctolite.	In W. T., p. 435.
24	Snowbank Lake, Minnesota.	A. N. Winchell.	A. N. Winchell, Am. G., XXVI, p. 303, 1900.	Cordierite norite.	In W. T., p. 309.
25	Baptism River, Minnesota.	Dodge and Sidener.	M. E. Wadsworth, G. S. Minn. B. 2, p. 79, 1887.	Gabbro.	In W. T., p. 273.
26	Granite Falls, Minnesota.	E. J. Babcock.	C. W. Hall, U. S. G. S. B. 157, p. 89, 1899.	Gabbro.	In W. T., p. 431.
27	Encampment Island, Minnesota.	C. Palache.	A. C. Lawson, G. S. Minn. B. 8, p. 6, 1893.	Anorthosite.	In W. T., p. 431.
28	San Diego, California.	L. v. Chrustchoff.	L. v. Chrustchoff, B. Soc. M. Fr., VIII, p. 8, 1885.	Hyperite.	In W. T., p. 435.
29	Bagley Canyon, Mount Diablo, California.	W. H. Melville.	W. H. Melville, B. G. S. A., II, p. 404, 1891.	Gabbro.	Not fresh. In W. T., p. 436.
30	Dehesa, San Diego County, California.	Horowitz.	Kesler and Hamilton, Am. G., XXXIV, p. 138, 1904.	Orbicular gabbro.	Whole mass. Incomplete?
31	Dehesa, San Diego County, California.	J. W. Howson.	A. C. Lawson, B. Dep. G. Un. Cal., III, p. 394, 1904.	Orbule from gabbro.	
32	St. Thomas, West Indies.	J. Siemiradzki.	J. Siemiradzki, N. J., II, p. 176, 1886.	Corsite.	In W. T., p. 431.
33	Allt Mhic, Leanain, Skye, Scotland.	T. Baker.	A. Harker, Rocks of Skye, p. 103, 1904.	Gabbro.	
34	Carn Dearg, Skye, Scotland.	T. Baker.	A. Harker, Rocks of Skye, p. 382, 1904.	Olivine gabbro.	"Alkalies omitted."
35	Druin an Eidhne, Skye, Scotland.	J. H. Player.	Geikie and Teall, Q. J. G. S., L, p. 653, 1894.	Basic schiere in gabbro.	In W. T., p. 369.
36	Lake Maree, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc. Edin., VIII, p. 55, 1901.	Gabbro.	
37	Glen Roy Argyllshire, Scotland.	G. Wilson.	G. S. U. K., Sum. Prog., p. 42, 1898.	Gabbro-diorite.	Not in W. T.
38	Belhelvie, Aberdeenshire, Scotland.	A. E. Brown.	T. G. Bonney, G. Mag., XXII, p. 442, 1885.	Troctolite.	Not fresh. In W. T., p. 431.
39	Carrock Fell, England.	G. Barrow.	A. Harker, Q. J. G. S., L, p. 323, 1894.	Quartz gabbro.	Anal. doubtful in reference. In W. T., p. 291.

GABBRO—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
40 C3. V	42.81	14.55	n. d.	20.52	1.62	3.96	5.57	2.01	6.38	0.40	1.90	0.51			100.23	
41 C3. V	52.4	20.7	3.2	6.4	4.2	8.3	2.9	1.2	0.3						99.6	
42 D3. V	38.47	18.89	1.92	0.78	4.33	30.34	1.15	1.54	2.89					X Cl 0.41 S 0.08 0.31	100.31	3.05
43 D2. V	61.28	21.58	0.22	1.59	1.85	7.51	4.44	0.74	0.40		0.40	0.52	1.85		102.68 (100.77)	
44 C2. IV	53.28	23.30	4.13	3.25	3.02	5.01	3.95	1.51	n. d.		1.80	0.80			100.22	
45 C4. V	52.61	27.15	4.05	n. d.	1.55	9.96	4.53	0.78	n. d.		0.23				100.87	
46 C4. V	52.21	19.24	10.46	n. d.	2.36	7.28	3.48	1.09	n. d.		3.12	1.21			100.45	
47 C4. V	49.89	24.39	6.09	n. d.	3.91	9.61	5.30	0.29	n. d.		1.22				100.70	
48 D4. V	48.38	23.66	8.03	n. d.	6.58	11.02	2.60	1.09	n. d.						101.36	
49 C2. IV	49.03	27.89	1.47	1.89	1.89	14.11	1.33	0.49	0.74	0.07	0.60	0.29		CO ₂ 0.17 SO ₃ 0.25	100.22	
50 C2. IV	45.94	20.84	4.30	4.96	5.71	11.77	3.04	0.51	0.68	none	1.14	0.45		CO ₂ 0.12 SO ₃ 0.91	100.42	
51 C2. IV	40.25	18.86	7.03	8.21	6.78	10.45	1.44	0.36	1.41	0.06	1.72	1.65		CO ₂ 0.12 SO ₃ 1.44	99.78	
52 C2. IV	49.90	23.33	4.10	4.38	1.65	10.97	3.06	0.62	0.60	0.13	0.42	0.49		FeS ₂ 0.32	99.97	
53 C2. IV	49.48	20.60	4.23	3.75	4.16	13.07	2.65	0.21	0.25	0.11	0.32	0.87		FeS ₂ 0.28	99.98	
54 C2. IV	47.78	20.51	2.54	6.07	4.62	10.65	4.69	0.51	0.54	0.10	0.26	0.49		FeS ₂ 0.31	99.07 (100.07)	
55 C3. V	47.75	22.49	4.53	3.23	0.59	15.99	0.91	1.75	0.76			0.48	1.53		100.01	
56 D4. V	47.37	14.65	13.74	n. d.	0.51	13.27	3.58	1.29	1.09				4.69		100.19	2.635
57 C4. V	46.57	19.56	n. d.	5.82	9.27	13.29	3.24	0.51	2.88						101.14	
58 B3. V	45.76	20.48	1.99	4.18	8.50	11.57	3.56	0.80	2.80						99.64	
59 C3. V	63.05	14.31	1.32	6.65	4.38	3.91	2.06	0.82	2.54					SnO ₂ 0.22 CuO 0.04	100.20	

GABBRO—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
40	Cataclews Point, Cornwall.	J. J. Beringer.	H. Fox, Tr. G. Soc. Corn., XII, p. 71, 1896.	Biotite-plagioclase rock.	In W. T., p. 433.
41	Near St. Quay, Brittany.	Not stated.	J. de Lapparent, B. Soc. M. Fr., XXXIII, p. 265, 1910.	Hypersthene gabbro.	
42	Stazzona, Orezza, Corsica.	M. Oels.	M. Oels, Ref., N. J., I, p. 46, 1896.	Gabbro.	In W. T., p. 433.
43	Ramsaas, Norway.	C. Bugge.	C. Bugge, Fh. Vid. Selsk. Christ. (1906), No. 8, p. 19, 1907.	Kugel norite.	Groundmass. Sum?
44	Theingsvaag, Soggendal, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., No. 5, p. 142, 1896.	Quartz norite.	In W. T., p. 435.
45	Rekefjord, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., No. 5, p. 79, 1896.	Norite.	In W. T., p. 205.
46	Rekefjord, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., No. 5, p. 79, 1896.	Quartz norite.	In W. T., p. 435.
47	Birkrem, Norway.	C. F. Kolderup.	C. F. Kolderup, Berg. Mus. Aarb., No. 5, p. 96, 1896.	Norite.	In W. T., p. 435.
48	Fyrtornet, Kullen, Sweden.	L. Ramberg.	A. Hennig, Lunds. Un. Aars., XXXIV (2), No. 6, p. 41, 1898.	Gabbro.	Not in W. T.
49	Bohnstadt, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 12, 1906.	Gabbro.	
50	Waldsaum, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 12, 1906.	Gabbro.	
51	Altereichberg, near Waschenbach, Odenwald.	G. Butzbach.	G. Klemm, Nb. Ver. Erdk. (4), XXVII, p. 12, 1906.	Gabbro-diorite.	
52	Oberkaimsbach, Hesse.	W. Sonne.	C. Chelius, Erl. G. Kt. Hes., Bl. Brensbach, p. 20, 1897.	Olivine gabbro.	In W. T., p. 433.
53	Vierstock, near Kaimsbach, Hesse.	W. Sonne.	C. Chelius, Erl. G. Kt. Hes., Bl. Brensbach, p. 20, 1897.	Olivine gabbro.	In W. T., p. 433.
54	Wallbach, Hesse.	W. Sonne.	C. Chelius, Erl. G. Kt. Hes., Bl. Brensbach, p. 20, 1897.	Olivine gabbro.	In W. T., p. 285.
55	Frankenstein, Hesse.	F. W. Schmidt.	Chelius and Klemm, Erl. G. Kt. Hes., IV, p. 39, 1896.	Olivine gabbro.	In W. T., p. 433.
56	Eichberg, Hesse.	F. W. Schmidt.	Chelius and Klemm, Erl. G. Kt. Hes., I, p. 18, 1886.	Gabbro.	In W. T., p. 433.
57	Rossw ein, Saxony.	Sachsse and Becker.	Sachsse and Becker, Ref., N. J., II, p. 503, 1893.	Gabbro.	In W. T., p. 433.
58	Rossw ein, Saxony.	Sachsse and Becker.	Sachsse and Becker, Ref. N. J., 1893, II, p. 503.	Gabbro.	In W. T., p. 303.
59	Burgstein, Klein Wenden, Erzgebirge.	Hilger.	F. v. Sandberger, Sb. Bay. Ak. W., XVIII, p. 444, 1888.	Gabbro.	In W. T., p. 221.

GABBRO—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
60 C3. V	50.95	7.21	1.29	7.39	6.13	20.31	5.53	1.03	0.77						100.66	3.102
61 C3. V	50.10	6.93	2.11	5.26	16.18	16.70	0.71	n. d.	2.35	0.22			trace		100.56	3.09
62 C2. IV	49.98	21.54	2.04	4.84	6.15	10.80	1.94	0.10	1.90		0.62				99.91	
63 C3. V	47.22	24.56	2.40	3.24	4.54	16.00	1.45	0.36	0.80			0.10	trace	S 0.09	100.76	
64 D3. V	46.92	20.36	2.12	5.02	7.06	15.44	1.78	1.37	0.82			0.38	trace	S 0.09	101.36	
65 D3. V	46.26	19.18	2.72	6.38	7.19	13.60	2.73	1.32	1.86			0.26	trace	S trace	101.50	
66 C3. V	44.28	22.10	2.39	3.35	8.14	16.70	0.50	0.13	2.96			0.67		S trace	101.22	
67 C3. V	41.25	18.02	3.44	3.97	14.19	10.36	2.12	0.65	6.00			0.06	trace	S 0.08	100.14	
68 C3. V	45.98	28.34	1.41	3.19	4.72	14.70	1.38	0.32	0.94			0.09		S 0.02	101.09	
69 C3. V	46.60	22.60	3.20	6.65	6.88	10.52	2.66	0.29	1.08		0.80				101.28	
70 D3. V	46.80	15.52	2.10	8.44	9.50	12.94	2.48		0.74			0.30	1.18		100.00	
71 B3. IV	48.40	15.38	4.81	6.32	8.09	11.61	2.88	0.72	1.87		0.07				100.15	
72 C3. V	47.30	23.45	6.15	0.49	11.05	7.56	1.34	0.34	1.72					S 0.16	99.56	
73 D4. V	40.49	16.20	22.10	n. d.	7.04	14.25	1.45	0.19	0.05						101.77	
74 C3. V	46.64	24.45	2.56	6.44	1.60	10.44	5.46	1.39	0.95						99.93	
75 C3. V	41.08	21.01	4.79	9.17	8.01	14.68	0.56	0.61	0.80		0.21				100.92	
76 C3. V	49.27	24.43	3.25	0.10	6.78	11.85	3.46	0.53	0.71						100.38	
77 B3. IV	48.90	18.08	2.52	3.20	11.43	14.10	1.53	0.25	0.88				trace	S trace	100.89	
78 C4. V	48.40	17.53	n. d.	4.28	16.51	11.11	1.80		0.76					FeS ₂ 0.52	100.91	
79 B3. IV	47.00	23.67	2.31	3.20	8.72	11.40	2.40	0.70	0.62				trace		100.02	

GABBRO—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
60	Studené, Eule, Bohemia.	V. Stanek.	E. Rade, Ref. N. J., 1899, II, p. 58.	Gabbro.	"Bronzite-rich". In W. T., p. 433.
61	Studené, Eule, Bohemia.	Barvir.	H. L. Barvir, Ref. N. J., 1904, I, p. 49.	Gabbro.	"Bronzite- free."
62	Schluckenau, Bohemia.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, LI, p. 149, 1903.	Gabbro.	Inclusion in basalt.
63	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien, LIX (1), p. 188, 1909.	Gabbro.	
64	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien, LIX (1), p. 188, 1909.	Gabbro.	
65	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien, LIX (1), p. 188, 1909.	Gabbro.	
66	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien, LIX (1), p. 197, 1909.	Olivine gabbro.	
67	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien, LIX (1), p. 197, 1909.	Spinel-olivine gabbro.	
68	Sopot, Eisengebirge Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien, LIX (1), p. 197, 1909.	Olivine norite.	
69	Schluckenau, Bohemia.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, LI, p. 150, 1903.	Gabbro.	Inclusion in basalt.
70	Schwarzstein, near Zöptau, Moravia.	R. Nowicki.	F. Kretschmer, Jb. G. R.-A. Wien, LXI, p. 92, 1911.	Gabbro.	Other anal. in paper.
71	Almasel, Hunyad, Hungary.	K. Emszt.	P. Rozlozsnik, F. K., XXXV, p. 508, 1905.	Microgabbro.	
72	Alvacza, Hunyad, Hungary.	G. v. Lazlo.	K. V. Papp, Jb. Ung. G. A. (1903), p. 85, 1905.	Gabbro.	
73	Jablanica, Herzegowina.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XXXVIII, p. 352, 1888.	Gabbro.	In W. T., p. 433.
74	Traversella Valley, Monzoni, Tyrol.	C. Doelter.	C. Doelter, T. M. P. M., XXI, p. 105, 1902.	Labradorite rock (gabbro?).	17 per cent nephelite in norm.
75	Ricoletta, Monzoni, Tyrol.	C. Doelter.	C. Doelter, T. M. P. M., XXI, p. 102, 1902.	Olivine gabbro.	
76	Kopilo, Bosnia.	F. Kucan.	M. Kispatic, T. M. P. M., XXIX, p. 175, 1910.	Gabbro.	
77	Monte Collon, near Arolla, Switzerland.	A. Brunet.	A. Brun, Ref. N. J. 1897, I, p. 475.	Gabbro.	In W. T., p. 335.
78	Monte Collon, near Arolla, Switzerland.	A. Brunet.	A. Brun, Ref. N. J., 1897, I, p. 475.	Gabbro.	In W. T., p. 433.
79	Monte Collon, near Arolla, Switzerland.	A. Brunet.	A. Brun, Ref. N. J., 1897, I, p. 475.	Gabbro.	In W. T., p. 433.

GABBRO—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
80 C3. V	41.55	21.40	11.38	1.35	12.20	7.80	0.80	0.24	3.65				trace	F FeS ₂ trace 0.50	100.87	
81 B3. IV	50.04	18.22	5.26	6.15	7.34	8.80	2.95	0.41	n. d.		0.30	0.23			99.70	
82 B3. IV	49.20	23.91	1.88	3.65	6.19	10.71	3.73	0.34	n. d.		0.18	0.08			99.87	
83 B3. IV	47.31	20.58	7.55	8.08	2.07	9.84	3.43	0.53	0.56		0.47				100.42	
84 C2. IV	48.85	18.63	4.32	8.42	3.41	8.53	3.98	1.25	1.67		1.67	0.36			101.09	
85 C2. IV	42.60	19.61	7.27	9.69	6.80	10.02	1.88	0.85	0.70		1.01	0.42	0.60		101.45	
86 D3. V	46.03	22.76	1.50	1.10	5.49	20.24	1.61	0.48	1.55	0.12	0.33	trace		Cr ₂ O ₃ trace	101.39	
87 A4. IV	49.84	14.83	5.57	n. d.	9.84	14.05	2.92	0.23	3.61			0.01	trace		100.90	
88 B4. V	52.29	18.61	10.79	n. d.	4.69	2.36	5.16	1.86	4.65			0.28			100.69	
89 C4. V	49.42	3.37	1.30	5.75	34.97	2.11	n. d.	n. d.	1.84					CO ₂ 0.76 NiO 0.16	99.68	
90 B3. IV	48.65	15.95	2.49	6.32	11.53	11.66	1.96	n. d.	1.67					NiO trace	100.23	
91 B3. IV	52.00	22.95	0.21	0.47	0.44	18.50	2.40	0.42	3.24						100.42	
92 D2. V	50.47	18.98	4.22	6.16	5.62	11.72	2.75	0.56	1.06		0.12		0.12		101.78	
93 B3. IV	50.24	19.48	5.45	5.02	4.84	11.02	3.33	0.77	0.75				trace		100.70	
94 D3. V	46.85	9.10	3.43	8.75	18.00	15.52	0.76	0.19	0.15				trace		102.75	
95 D3. V	45.76	23.85	3.80	3.79	4.06	17.22	2.41	0.15	0.32				trace		101.36	
96 D3. V	45.74	5.21	6.91	8.33	21.63	12.80	1.02	0.13	0.09				trace		101.86	
97 D3. V	45.53	9.16	4.86	9.34	15.58	15.04	0.87	0.20	0.88				trace		101.46	
98 C4. V	45.35	11.27	6.44	6.42	12.68	15.28	1.42		0.56				trace		99.42	
99 C3. V	43.51	21.97	4.95	5.72	6.10	15.93	2.04	0.15	0.60						100.97	

GABBRO—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
80	Monte Collon, near Arolla, Switzerland.	A. Brunet.	A. Brun, Ref. N. J., 1897, I, p. 475.	Gabbro.	In W. T., p. 433.
81	Leprese, Valtellina, Lombardy.	O. Hecker.	O. Hecker, N. J. B. B., XVII, p. 337, 1903.	Hornblende gabbro.	
82	Leprese, Valtellina, Lombardy.	O. Hecker.	O. Hecker, N. J. B. B., XVII, p. 333, 1903.	Hornblende gabbro.	
83	Leprese, Valtellina, Lombardy.	O. Hecker.	O. Hecker, N. J. B. B., XVII, p. 325, 1903.	Hornblende- olivine gabbro.	
84	Near Sondalo, Valtellina, Lombardy.	A. Zapf.	A. Zapf, In. Diss. Jena, p. 37, 1910.	Hornblende gabbro.	
85	Val Scala, Valtellina, Lombardy.	A. Zapf.	A. Zapf, In. Diss. Jena, p. 51, 1910.	Norite.	
86	Rocca Bianca, Val Susa, Piedmont.	Not stated.	F. Zambonini, N. J., 1906, II, p. 111.	Gabbro.	
87	Monte Ferrato, Tuscany.	U. Panichi.	U. Panichi, Mem. Soc. Tosc., XXV, p. 9, 1909.	Euphotide.	
88	Romito, near Livorno, Tuscany.	E. Manasse.	E. Manasse, Pr. Soc. Tosc., XII, p. 165, 1901.	Gabbro rosso.	
89	Gaggio Montano, near Bologna, Italy.	P. E. V. de Regny.	P. E. V. de Regny, B. Soc. G. It., XVIII, p. 25, 1899.	Norite.	In W. T., p. 367.
90	Gaggio Montano, near Bologna, Italy.	P. E. V. de Regny.	P. E. V. de Regny, B. Soc. G. It., XVIII, p. 24, 1899.	Gabbro.	In W. T., p. 335.
91	Dshaksy, Tau Mountains, Mugodjaren, Ural Mountains.	Loewinson-Lessing.	E. Jeremina, Exp. Mugodj., p. 129, 1905.	Gabbro-syenite.	
92	Cerebriansky, Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 464, 1905.	Norite.	
93	Cerebriansky, Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 464, 1905.	Norite.	
94	Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord., II, p. 440, 1905.	Tilaite.	
95	Cerebriansky, Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 478, 1905.	Gabbro.	Uralitized.
96	Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 440, 1905.	Tilaite.	
97	Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, 440, 1905.	Tilaite.	
98	Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 440, 1905.	Tilaite.	
99	Cerebriansky, Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pambil, B. Soc. M. Fr., XXXIII, p. 360, 1910.	Gabbro.	Uralitized.

GABBRO—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
100 C3. V	41.75	7.92	12.46	11.56	8.40	16.84	0.92	0.63	n. d.				0.72		101.20	
101 B3. IV	41.26	20.09	6.10	7.65	8.14	14.64	1.68	0.16	0.89						100.61	
102 C3. V	41.04	9.04	7.81	9.99	11.99	17.08	0.47	0.09	3.05		0.84				101.40	
103 D4. V	48.65	17.17	1.04	10.81	7.17	10.80	4.08		1.65						101.87	
104 C4. V	48.21	18.37	1.86	9.87	5.24	12.18	3.63		1.78						101.14	
105 D3. V	47.99	17.76	4.53	8.08	5.15	12.33	3.99	0.43	1.83						102.09	
106 D3. V	49.97	13.50	3.55	11.46	6.51	10.63	2.78	0.26	1.60		1.30		trace		101.56	
107 C4. V	46.15	13.57	3.61	8.15	12.63	15.15	1.29	trace	n. d.						100.55	
108 C3. V	38.59	24.37	7.66	5.23	5.95	15.30	1.34	0.46	0.84						99.64	
109 B3. IV	45.45	17.40	4.43	7.34	11.06	11.95	1.76	trace	0.36						99.75	
110 B3. IV	42.56	21.99	4.69	5.40	6.69	17.06	1.67	0.35	0.17						100.58	
111 D3. V	37.82	19.94	3.48	12.70	10.97	14.71	1.68	n. d.	0.57						101.82	
112 C3. V	42.92	26.42	3.97	2.81	7.26	15.40	0.63	n. d.	0.80						100.21	
113 B3. IV	46.56	9.70	2.83	9.61	13.30	15.65	1.82	0.94	0.47				trace	Cr ₂ O ₃ trace	100.88	
114 C3. V	46.56	9.24	3.92	8.69	13.85	16.09	1.52	0.93	0.36				trace	Cr ₂ O ₃ trace	101.16	
115 C3. V	49.17	12.03	10.81	2.12	7.84	12.30	2.53	0.71	0.30			0.09	2.53	SO ₃ 0.04 NiO 0.08 CuO 0.06	100.49	
116 B3. IV	44.63	21.19	4.26	2.33	8.36	17.26	0.60	0.38	0.57			trace	0.38	SO ₃ 0.04 NiO 0.08 CuO 0.06	100.17	
117 B3. IV	43.58	28.18	1.73	1.84	4.82	18.34	0.10	0.23	0.80			0.08	0.21	SO ₃ 0.08	100.09	
118 C3. V	42.13	21.36	11.60	2.74	5.58	10.78	1.69	0.77	1.40			0.01	1.47	SO ₃ 0.14 NiO trace CuO 0.68	99.75	
119 D3. V	47.54	20.56	2.56	7.74	3.25	12.10	3.29	0.79	2.50		0.91		0.05		101.29	

GABBRO—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
100	Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 448, 1905.	Tilaite.	
101	Cerebriansky, Tilai Mountains, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 478, 1905.	Gabbro.	Uralitized.
102	Mount Katschkanar Iss District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 356, 1910.	Tilaite.	
103	Katechersky, Koswinsky, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 214, 1902.	Gabbro.	
104	Katechersky, Koswinsky, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 214, 1902.	Gabbro.	
105	Katechersky, Koswinsky, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 214, 1902.	Gabbro.	
106	Joubrechkin, Wichera, Ural Mountains.	Not stated.	Duparc, Pearce, and Tikanowitch, Oural Nord, III, p. 186, 1909.	Gabbro.	
107	Deneshkin Kamen, Ural Mountains.	Krekmeier and Kultacheff.	Loewinson-Lessing, Jushno-Saorsk., p. 166, 1900.	Gabbro.	In W. T., p. 335.
108	Deneshkin Kamen, Ural Mountains.	Loewinson-Lessing.	Loewinson-Lessing, Jushno-Saorsk., p. 166, 1900.	Gabbro-norite.	In W. T., p. 433.
109	Supreya, Ural Mountains.	Kultacheff.	Loewinson-Lessing, Jushno-Saorsk., p. 167, 1900.	Pyroxene granulite (gabbro).	In W. T., p. 335.
110	Supreya, Ural Mountains.	Loewinson-Lessing.	Loewinson-Lessing, Jushno-Saorsk., p. 166, 1900.	Magnetite gabbro.	Light bands. In W. T., p. 433.
111	Supreya, Ural Mountains.	Loewinson-Lessing.	Loewinson-Lessing, Jushno-Saorsk., p. 166, 1900.	Magnetite gabbro.	Dark bands. In W. T., p. 433.
112	Talaya, Ural Mountains.	Loewinson-Lessing and Kultacheff.	Loewinson-Lessing, Jushno-Saorsk., p. 166, 1900.	Pyroxene granulite (gabbro)	In W. T., p. 293.
113	Pharkowsky-Ouwal Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 145, 1902.	Gabbro.	
114	Pharkowsky-Ouwal Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 145, 1900.	Gabbro.	
115	Werkh Issetsk, Mursinsk, Ural Mountains.	G. Katerfeld.	W. Nikitin, Mem. C. G. Rus., XXII, p. 84, 1907.	Gabbro.	MnO high.
116	Werkh Issetsk, Mursinsk, Ural Mountains.	G. Katerfeld.	W. Nikitin, Mem. C. G. Rus., XXII, p. 77, 1907.	Gabbro.	
117	Werkh Issetsk, Mursinsk, Ural Mountains.	G. Katerfeld.	W. Nikitin, Mem. C. G. Rus., XXII, p. 78, 1907.	Gabbro.	
118	Werkh Issetsk, Mursinsk, Ural Mountains.	G. Katerfeld.	W. Nikitin, Mem. C. G. Rus., XXII, p. 82, 1907.	Hornblende gabbro.	
119	Mount Popretchnaia, Tagil District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 360, 1910.	Gabbro.	

GABBRO—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
120 D3. V	43.67	15.68	2.89	6.97	14.94	14.93	1.12	0.36	0.53		0.34		trace		101.43	
121 D2. V	50.14	15.65	1.06	10.11	5.05	8.62	2.85	1.19	0.17	0.17	2.47	0.38	0.20		98.86	
122 D4. V	50.00	16.51	0.02	12.25	5.51	9.47	2.34	1.46	1.41						98.97	
123 C4. V	47.33	15.17	1.21	10.67	9.94	11.32	3.01	trace	0.91						99.56	
124 B3. IV	46.44	19.80	3.20	8.66	6.23	9.75	2.11	1.43	2.21						99.83	
125 B3. IV	46.10	18.20	5.50	4.95	7.54	11.63	4.03	0.42	2.80						101.17	
126 D4. V	49.36	22.95	11.33	n. d.	2.37	11.07	(2.92)		0.19						100.00	
127 C3. V	50.41	20.29	0.33	12.41	5.90	7.39	3.05	0.42	0.07	0.12	0.24	0.09	0.12		100.84	
128 D4. V	50.45	6.50	2.49	8.38	19.02	7.82	n. d.	n. d.	0.97		0.63	trace	trace		96.26	
129 B3. IV	47.39	22.00	4.00	5.56	1.77	13.27	2.52	0.83	1.25		1.83				100.42	
130 C3. V	47.97	20.03	8.08	1.29	5.43	12.10	1.54	0.17	2.04		1.46	trace	trace		100.11	
131 C3. V	48.10	20.85	4.85	10.55	3.99	7.15	2.73	0.63	1.00						99.85	2.68
132 C4. V	37.87	20.07	5.42	n. d.	1.01	31.80	1.35	1.17	0.56					CO ₂ 0.75	100.00	
133 A4. IV	46.81	19.25	n. d.	1.85	14.23	16.80	0.57	0.13	1.00					Cr ₂ O ₃ 0.21	100.85	

DIABASE.

1 D2. V	46.09	17.89	14.22	n. d.	5.04	10.30	3.82	1.10	0.26		3.45	0.05	0.28	S 0.47	102.97	
2 B3. IV	52.54	15.14	0.85	10.73	5.22	6.92	5.46	1.43	1.76		1.00				101.05	
3 B4. V	49.88	15.29	0.43	11.30	7.83	4.54	2.17	0.62	5.17					CO ₂ 3.20	100.43	
4 C4. V	48.08	23.67	9.07	n. d.	3.92	10.99	1.92	0.49	0.83			1.11			100.08	3.030
5 C4. V	47.84	25.40	6.72	n. d.	5.25	8.44	2.55	0.60	2.53			0.94			100.27	3.080

GABBRO—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
120	Tschissopa Mountain, Ural Mountains.	F. Pearce.	Duparc and Pearce, C. R., CXLIV, p. 1289, 1907.	Tilaite.	
121	Goroschki, Volhynia, Russia.	W. Tarassenko.	W. Tarassenko, Ref. N. J., 1899, I, p. 463.	Gabbro-norite.	In W. T., p. 433.
122	Tschatsch, Kasbek, Caucasus.	Loewinson-Lessing and Sewastjanow.	Loewinson-Lessing, Mat. G. Rus., XXI, p. 107, 1901.	Hornblende gabbro.	
123	Kistinka Valley, Kasbek, Caucasus.	Loewinson-Lessing.	Loewinson-Lessing, Mat. G. Rus., XXI, p. 107, 1901.	Hornblende gabbro.	
124	Tumagorkaja, Caucasus.	D. Beljankin.	Loewinson-Lessing, Vh. Rus. M. Ges., XLII, p. 265, 1905.	Microgabbro.	
125	Voltes, Syra, Aegean Sea.	K. A. Ktenas.	K. A. Ktenas, T. M. P. M., XXVI, p. 294, 1907.	Saussurite gabbro.	
126	Duwona, Uganda.	A. Roccati.	A. Roccati in Duca Abruz., Ruvenzori, p. 184, 1909.	Hypersthene gabbro.	Other analyses in same work.
127	Anabar River, Siberia.	H. Backlund.	H. Backlund, Tr. Mus. G. St. P., I, p. 149, 1907.	Quartz gabbro.	
128	Sone River, South Rewa, India.	P. Brühl.	T. H. Holland, Rec. G. S. Ind., XXX, p. 20, 1897.	Olivine norite.	In W. T., p. 435.
129	Mount Lekaan, Motomorock, Timor.	C. Menschaar.	R. D. M. Verbeek, Jb. Mijnw., XXXVII, p. 412, 1908.	Gabbro.	Schistose.
130	Tumleo, Kaiser Wilhelm Land, New Guinea.	E. Ludwig.	S. Richarz, N. J. B. B., XXIX, p. 445, 1910.	Hornblende gabbro.	
131	Bluff, Otago, New Zealand.	L. J. Wild.	L. J. Wild, Tr. N. Z. Inst., XLIV, p. 324, 1912.	Norite.	
132	Codes Point, Dun Mountain, Nelson, New Zealand.	J. S. MacLaurin.	J. M. Bell, N. Z. G. S. B. 12, p. 33, 1911.	Rodingite.	
133	Ouen Island, New Caledonia.	Boiteau.	A. Lacroix, C. R., CLII, p. 819, 1911.	Ouenite (gabbro).	

DIABASE.

1	Bjornesund, Haibergs Island, Eureka Sound, Ellesmere Land.	P. Schei.	C. Bugge, Rep. 2d Fram Exp., No. 22, p. 37, 1910.	Diabase.	
2	Pense Township, Gowganda District, Ontario.	N. L. Bowen.	N. L. Bowen, J. G., XVIII, p. 667, 1910.	Diabase.	
3	Dome mine, Porcupine, Ontario.	Not stated.	A. G. Burrows, Rep. Bur. Min. Ont., XXI (1), p. 212, 1912.	Diabase.	
4	Whitefish Bay, Rainy Lake, Ontario.	F. T. Shutt.	A. C. Lawson, Am. G., VII, p. 161, 1891.	Diabase.	30 feet from contact. In W. T., p. 439.
5	Stop Island, Rainy Lake, Ontario.	F. T. Shutt.	A. C. Lawson, Am. G., VII, p. 158, 1891.	Diabase.	4 feet from contact. In W. T., p. 439.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
6 D4. V	47.83	30.28	4.57	n. d.	4.32	6.72	1.30	trace	2.05			2.19			99.26	3.028
7 D4. V	47.50	22.44	7.40	n. d.	3.71	10.21	1.62	1.29	2.85			0.34			97.36	2.927
8 A4. IV	48.79	16.97	1.69	8.97	6.98	9.98	3.30	n. d.	2.65		1.10		0.20		100.63	2.96
9 C2. IV	48.75	17.97	0.41	13.62	3.39	8.82	1.63	2.40	0.60		0.99	0.68	0.91	CO ₂ S trace trace	100.17	2.985
10 B3. IV	47.28	20.22	3.66	8.89	3.17	7.09	3.94	2.16	2.73			0.68	0.77		100.59	
11 C4. V	44.44	23.19	12.70	n. d.	2.82	6.03	3.93	1.75	3.73			0.70	0.52		99.81	
12 B3. IV	48.20	14.12	2.00	7.41	8.19	11.50	2.60	0.23	2.20		1.58		1.24		99.27	3.02
13 C4. V	50.89	15.39	5.77	7.60	8.75	5.67	2.72	2.46							99.25	
14 D4. V	44.51	19.99	7.22	n. d.	8.11	8.15	5.24	2.60	2.93						98.75	
15 C4. V	45.46	19.94	15.36	2.95	8.32	2.12	3.21	2.30							99.66	
16 C4. V	44.86	17.24	11.12	n. d.	4.98	7.53	1.50	2.81	2.44		6.66	0.41	trace		99.55	
17 B4. V	51.46	13.98	2.66	8.92	7.59	10.49	4.75		n. d.		1.06	0.17			101.08	
18 C4. V	50.81	13.25	14.66	n. d.	6.97	10.96	0.76	1.71	0.88						100.00	
19 C4. V	50.61	18.34	n. d.	13.91	6.73	7.01	1.60	1.08	1.72						100.00	
20 B3. IV	46.87	13.36	9.79	2.71	4.35	14.70	4.64	2.01	n. d.		1.98				100.41	
21 B4. V	52.06	13.67	15.97	n. d.	5.01	8.15	3.36	0.86	1.05						100.13	2.953
22 D4. V	51.08	23.58	6.85	n. d.	4.95	9.36	2.34		n. d.				0.39		100.00	
23 B4. V	47.87	14.43	11.55	n. d.	10.58	10.45	3.47	0.61	1.82						100.78	
24 D4. V	45.73	13.48	11.60	n. d.	15.40	9.92	3.24	0.47	0.94						100.78	3.026
25 D4. V	42.07	32.05	9.83	n. d.	1.38	0.95	1.11		12.13				0.48		100.00	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
6	Stop Island, Rainy Lake, Ontario.	F. T. Shutt.	A. C. Lawson, Am. G., VII, p. 158, 1891.	Diabase.	At contact. In W. T., p. 439.
7	Whitefish Bay, Rainy Lake, Ontario.	F. T. Shutt.	A. C. Lawson, Am. G., VII, p. 161, 1891.	Diabase.	At contact. In W. T., p. 439.
8	Pittsburg, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XII, p. 133, 1876.	Metadiabase.	Not in W. T.
9	Pine Hill, Medford, Massachusetts.	R. C. Sweetser.	W. H. Hobbs, B. Mus. Comp. Zool., XVI, p. 9, 1888.	Diabase.	In W. T., p. 287.
10	Medford, Massachusetts.	G. P. Merrill.	G. P. Merrill, B. G. S. A., VII, p. 353, 1896.	Diabase.	In W. T., p. 273.
11	Medford, Massachusetts.	G. P. Merrill.	G. P. Merrill, B. G. S. A., VII, p. 353, 1896.	Diabase.	Weathered. In W. T., p. 437.
12	Derby, Connecticut.	G. W. Hawes.	G. W. Hawes, A. J. S., XI, p. 124, 1876.	Metadiabase.	Not in W. T.
13	Indian Point, Chateaugay Lake, New York.	A. S. Eakle.	A. S. Eakle, Am. G., XII, p. 35, 1893.	Diabase.	In W. T., p. 437.
14	Upper Chateaugay Lake, Clinton County, New York.	A. S. Eakle.	A. S. Eakle, Am. G., XII, p. 35, 1893.	Diabase.	In W. T., p. 437.
15	Palmer Hill, Essex County, New York.	J. F. Kemp.	Kemp and Marsters, U. S. G. S. B. 107, p. 26, 1893.	Diabase.	In W. T., p. 437.
16	Fort Montgomery, Hudson River, New York.	L. M. Dennis.	J. F. Kemp, Am. Naturalist, p. 694, 1888.	Hornblende diabase.	In W. T., p. 437.
17	Rocky Hill, New Jersey.	A. H. Phillips.	A. H. Phillips, A. J. S., VIII, p. 279, 1899.	Diabase.	In W. T., p. 437.
18	Little Falls, Passaic County, New Jersey.	W. C. Day.	W. C. Day, U. S. G. S. A. R. 20 (VI), p. 419, 1899.	Diabase.	Calculated to 100. In W. T., p. 437.
19	Mine Brook, Somerset County, New Jersey.	T. B. Stillman.	W. C. Day, U. S. G. S. A. R. 20 (VI), p. 419, 1899.	Diabase.	Calculated to 100. In W. T., p. 437.
20	Birdsboro, near Morristown, Pennsylvania.	H. Fleck.	W. C. Day, U. S. G. S. A. R. 19 (2), p. 222, 1898.	Diabase.	In W. T., p. 315.
21	Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, Am. G., XXII, p. 87, 1898.	Quartz diabase.	In W. T., p. 437.
22	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, Am. G., XXIV, p. 360, 1899.	Diabase.	In W. T., p. 437.
23	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, Am. G., XXII, p. 87, 1898.	Olivine diabase.	In W. T., p. 437.
24	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, Am. G., XXII, p. 87, 1898.	Olivine diabase.	In W. T., p. 437.
25	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, Am. G., XXIV, p. 360, 1899.	Diabase.	Not fresh. In W. T., p. 437.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
26 D4. V	37.09	13.19	35.69	n. d.	0.57	0.41	1.75	0.33	11.83						100.86	
27 D4. V	45.03	16.42	14.99	n. d.	6.15	7.98	2.74	0.84	n. d.						94.15	
28 C2. IV	51.34	20.07	7.03	4.03	4.18	2.83	1.83	5.53	2.90		0.38		0.38	CO ₂ none	100.50	
29 C2. IV	48.20	22.10	7.61	3.95	0.86	8.86	4.90	1.16	2.31		0.24		0.35	CO ₂ none	100.54	
30 D4. V	46.45	13.79	7.60	6.41	9.81	10.13	n. d.	n. d.	2.66		trace		trace	CO ₂ 2.27	99.12	
31 B4. V	39.55	28.76	16.80	n. d.	0.59	0.37	trace	trace	13.26		0.64	0.10	trace		100.07	
32 B3. IV	45.23	15.73	0.06	11.47	12.29	8.33	4.72	0.07	0.70	0.39	1.10	0.02	trace	S 0.08	100.19	
33 C3. V	49.27	16.75	7.78	4.86	7.44	5.47	5.42	0.48	2.80					CO ₂ 0.92	101.19	2.806
34 C3. V	46.45	16.60	2.72	7.25	9.21	6.32	4.05	1.02	5.01					CO ₂ 0.40	99.03	2.781
35 D3. V	46.25	18.39	7.70	3.52	4.65	12.19	3.76	1.04	3.41					CO ₂ 1.00	101.91	2.866
36 D3. V	47.01	17.80	5.32	6.59	8.75	5.31	2.00	1.58	n. d.		2.19				96.55	
37 C3. V	45.85	10.97	4.97	13.79	1.61	5.71	0.91	9.29	2.55	0.35	1.69	0.38	0.14	CO ₂ trace SO ₃ 1.78	99.99	
38 C3. V	45.69	14.44	6.21	9.39	2.19	7.44	0.96	6.96	2.35	0.55	1.90	0.32	0.33	CO ₂ trace SO ₃ 1.30	100.03	
39 D3. V	44.91	18.01	4.50	7.64	7.67	7.49	1.75	1.33	n. d.		2.54				95.84	
40 C2. IV	65.00	14.01	6.42	0.44	2.83	0.85	1.82	5.42	1.93	0.26	0.69	0.07	0.10	CO ₂ 0.07 S none BaO 0.06	99.97	2.690
41 C3. V	52.91	17.56	none	8.61	4.90	7.55	3.72	1.70	1.57	none	0.92	0.20	0.11	Cr ₂ O ₃ 0.20	99.95	2.840
42 D3. V	50.47	18.45	2.13	7.74	6.90	6.61	2.58	0.30	2.34			trace			97.52	
43 D3. V	50.51	15.30	1.79	8.14	5.94	9.04	5.18	2.00	none	1.43	2.80		0.51		102.64	
44 D2. V	49.34	13.03	2.50	13.74	3.64	7.40	4.55	1.57	0.69	0.24	3.16	0.15	0.51	CO ₂ 0.96 ZrO ₂ 0.04 S 0.12 Cr ₂ O ₃ 0.02 BaO 0.03		
45 C4. V	46.80	15.21	13.13	n. d.	8.13	11.11	1.95	0.01	2.79						99.13	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
26	Chatham, Pittsylvania County, Virginia.	T. L. Watson.	T. L. Watson, Am. G., XXII, p. 87, 1898.	Olivine diabase.	Not fresh. In W. T., p. 437.
27	Southwest Mountain, Monticello, Virginia.	W. A. Lambeth.	W. A. Lambeth, In. Diss. Virg., p. 10, 1901.	Diabase schist.	Low sum due to H ₂ O?
28	Near Virgilina, Granville County, North Carolina.	T. L. Watson.	T. L. Watson, B. G. S. A., XIII, p. 364, 1902.	"Greenstone."	
29	Virgilina, Granville County, North Carolina.	T. L. Watson.	T. L. Watson, B. G. S. A., XIII, p. 364, 1902.	"Greenstone."	
30	Virgilina, Granville County, North Carolina.	T. L. Watson.	T. L. Watson, B. G. S. A., XIII, p. 364, 1902.	"Greenstone."	Weathered.
31	Wadesboro, North Carolina.	T. M. Chatard.	I. C. Russell, U. S. G. S. B. 52, p. 18, 1889.	Diabase.	Weathered. In W. T., p. 437.
32	Creighton Mine, Cherokee County, Georgia.	E. Everhardt.	S. P. Jones, Ga. G. S. B. 19, p. 68, 1909.	Olivine diabase.	
33	Isle Royale, Michigan.	F. P. Burrall.	A. C. Lane, Mich. G. S. Pub. VI (1), p. 215, 1898.	Melaphyre.	Not fresh. Not in W. T.
34	Isle Royale, Michigan.	F. P. Burrall.	A. C. Lane, Mich. G. S. Pub. VI (1), p. 143, 1898.	Melaphyre.	Not fresh. Same flow as below. Not in W. T.
35	Isle Royale, Michigan.	F. P. Burrall.	A. C. Lane, Mich. G. S. Pub. VI (1), p. 143, 1898.	Melaphyre.	Not fresh. Same flow as above. Not in W. T.
36	Mount Bohemia, Michigan.	L. Kirschbaum.	F. E. Wright, Mich. G. S. A. R. (1908), p. 377, 1909.	Ophite.	
37	Mount Bohemia, Michigan.	N. Cook.	F. E. Wright, Mich. G. S. A. R. (1908), p. 377, 1909.	Ophite.	
38	Mount Bohemia, Michigan.	N. Cook.	F. E. Wright, Mich. G. S. A. R. (1908), p. 377, 1909.	Ophite.	
39	Mount Bohemia, Michigan.	L. Kirschbaum.	F. E. Wright, Mich. G. S. A. R. (1908), p. 377, 1909.	Ophite.	
40	Tamarack Creek, Pine County, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 648, 1910.	Diabase.	Altered.
41	Stearns County, Minnesota.	F. F. Grout.	F. F. Grout, J. G., XVIII, p. 655, 1910.	Quartz diabase.	
42	Kawishiwi River, Minnesota.	C. F. Sidener.	H. V. Winchell, Minn. G. S. A. R. XVII, p. 126, 1889.	Diabase.	Altered. Not in W. T.
43	Stearns County, Minnesota.	B. F. Nochl (student).	F. F. Grout, J. G., XVIII, p. 655, 1910.	Diabase.	
44	Carlton County, Minnesota.	W. H. Truesdale (student).	F. F. Grout, J. G., XVIII, p. 655, 1910.	Olivine diabase.	
45	Good Harbor Bay, Lake Superior, Minnesota.	C. F. Sidener.	F. F. Grout, J. G., XVIII, p. 650, 1910.	Diabase.	Altered.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.	
46 B4. V	45.37	18.21	1.22	n. d.	6.98	11.49	0.84	0.02	4.66						99.77		
47 B4. V	46.28	12.96	4.67	6.06	8.71	10.12	3.75		3.34		3.54		trace		99.43	2.921	
48 C4. V	45.59	20.99	2.49	4.36	8.95	7.57	4.89		5.06						99.90	2.707	
49 D4. V	44.71	15.54	3.06	6.43	6.80	10.50	2.55		5.90		2.88		trace		98.37	2.858	
50 B3. IV	54.07	16.30	5.75	5.84	3.41	7.63	4.00	0.90	1.35						99.26	2.895	
51 C4. V	49.84	18.32	4.16	5.21	3.93	12.31	3.24	n. d.	2.05						99.06	2.960	
52 B3. IV	48.12	18.60	4.00	6.30	6.16	7.36	4.11	1.09	3.63						99.37	2.854	
53 D3. V	51.21	21.32	2.35	4.45	4.77	8.99	1.79	0.74	none		1.49	0.01	0.21	CO ₂ S	0.04 trace	100.37	3.010
54 D3. V	52.62	21.77	2.13	3.58	5.68	10.19	2.39	0.25	0.80		0.40	0.01	trace	CO ₂ S	0.04 trace	99.86	2.970
55 D2. V	52.20	16.10	3.50	5.68	6.70	8.58	2.40	0.89	0.60		2.60	0.37	0.22	CO ₂ ZrO ₂ Cl BaO CuO	0.01 none trace none trace	99.94	
56 D3. V	52.00	21.61	3.01	4.06	6.53	8.80	2.81	0.18	0.35		0.53	0.01	0.05	CO ₂ S	0.06 trace	100.00	3.066
57 D3. V	51.37	21.79	3.60	3.38	6.30	10.36	2.42	0.06	0.50		0.32	trace	0.12	CO ₂ S	0.10 trace	100.32	2.996
58 D3. V	51.19	24.52	1.46	4.67	5.33	9.58	2.09	0.60	0.30		0.40	0.01	trace	CO ₂ S	none trace	100.15	2.968
59 B4. V	46.20	12.23	9.25	8.95	4.93	8.50	3.91		1.72		3.10		1.10		99.89		
60 D4. V	49.58	19.16	14.61	n. d.	3.94	9.10	1.08		2.87						100.34	2.981	
61 D4. V	53.55	15.54	15.79	n. d.	5.79	6.71	1.41	1.96	1.83						102.58	3.02	
62 C4. V	51.85	13.50	16.43	n. d.	5.49	8.80	3.10	0.91	0.93						101.01		
63 C4. V	50.17	18.03	12.96	n. d.	6.12	8.86	3.00	0.81	1.02						100.97		
64 C3. V	49.65	9.26	15.25	4.12	3.21	8.82	4.39	1.75	2.43	0.33	1.42	0.43			101.06		

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
46	Grand Marais, Lake Superior, Minnesota.	C. F. Sidener.	F. F. Grout, J. G., XVIII, p. 650, 1910.	Diabase.	Altered.
47	Point Bonita, Marin County, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 106, 1893.	Diabase.	K ₂ O calculated as Na ₂ O. In W. T., p. 439.
48	Point Bonita, Marin County, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 106, 1893.	Diabase.	K ₂ O calculated as Na ₂ O. In W. T., p. 439.
49	Point Bonita, Marin County, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 106, 1893.	Diabase.	K ₂ O calculated as Na ₂ O. In W. T., p. 439.
50	Whistling Cay, St. John, West Indies.	P. T. Cleve.	P. T. Cleve, Sv. Vet. Ak. Hndg., IX, No. 12, p. 37, 1871.	Diabase.	Not in W. T.
51	Coral Bay, St. John, West Indies.	P. T. Cleve.	P. T. Cleve, Sv. Vet. Ak. Hndg., IX, No. 12, p. 37, 1871.	Diabase.	Not in W. T.
52	Bucks Island, St. Thomas, West Indies.	P. T. Cleve.	P. T. Cleve, Sv. Vet. Ak. Hndg., IX, No. 12, p. 37, 1871.	Diabase.	Not in W. T.
53	Average sample, Demerara River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 64, 1900.	Diabase.	Correct as No. 7. III.5.4.4-5. In W. T., p. 439.
54	Average sample, Potaro River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 63, 1900.	Diabase.	In W. T., p. 291.
55	Mazaruni District, British Columbia.	J. B. Harrison.	J. B. Harrison, pers. com.	Diabase-gabbro.	In W. T., p. 291.
56	Average sample, Essequibo River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 63, 1900.	Diabase.	Correct as No. 63, III.5.4.4-5. In W. T., p. 291.
57	Average sample, Essequibo River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 64, 1900.	Diabase.	Correct as No. 66, III.5.4.4-5. In W. T., p. 291.
58	Average sample, Potaro River, British Guiana.	Assistant of J. B. Harrison.	J. B. Harrison, Rep. G. Ess. Riv., p. 64, 1900.	Diabase.	Correct as No. 67, III.5.4.4-5. In W. T., p. 439.
59	Surinam, Dutch Guiana.	Weidig-Freiberg.	G. C. Dubois, T. M. P. M., XXII, p. 24, 1903.	Diabase.	
60	Agua Clara, Puenete de Chimbo, Ecuador.	J. Siemiradzki.	J. Siemiradzki, N. J. B. B., IV, p. 200, 1886.	Melaphyre.	In W. T., p. 445.
61	Hapucu, Sao Paulo, Brazil.	Not stated.	F. de P. Oliveira, Ref. N. J., 1891, II, p. 304.	Diabase.	In W. T., p. 439.
62	Bufao, Sao Paulo, Brazil.	Not stated.	F. de P. Oliveira, Ref. N. J., 1891, II, p. 304.	Diabase.	In W. T., p. 439.
63	Salinho do Pary, Sao Paulo, Brazil.	Not stated.	F. de P. Oliveira, Ref. N. J., 1891, II, p. 304.	Melaphyre.	In W. T., p. 445.
64	Cerro Howyi, Paraguay.	M. Goldschlag.	M. Goldschlag, In. Diss. Jena, p. 38, 1913.	Diabase porphyrite.	

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
65 D4. V	53.81	20.41	11.45	n. d.	1.76	1.65	2.55	3.72	3.98		0.19	0.12		Cl 0.05	99.78	
66 D4. V	46.4	20.4	6.9	n. d.	3.5	7.7	6.93	0.54	1.1		0.24			CO ₂ 5.8	99.51	
67 D4. V	36.80	22.95	n. d.	4.08	2.85	9.73	0.50	1.10	7.70		2.60	0.75	trace	CO ₂ 11.90		
68 B3. IV	57.57	14.25	6.04	3.95	4.24	6.87	2.98	1.08	1.25		trace	0.15	0.27	CO ₂ 0.30 S 0.19	99.14	
69 B4. V	53.70	18.21	10.64	n. d.	5.24	6.66	2.65	0.99	1.55						99.64	
70 B4. V	51.20	20.03	7.57	n. d.	6.75	10.52	1.71	0.51	1.70						99.99	2.885
71 C3. V	48.0	17.8	3.6	8.6	5.8	10.5	3.4	0.6	1.9						100.2	
72 D4. V	52.81	19.83	11.89	n. d.	5.32	0.95	3.54	2.71	3.10						100.15	
73 D4. V	51.20	17.34	12.43	n. d.	4.71	6.35	3.28	1.92	2.77		1.08	1.27			102.35	
74 C2. IV	49.41	15.11	2.70	9.63	5.11	8.80	3.71	0.70	2.90		2.82	0.32			101.21	
75 C4. V	48.60	19.15	6.55	n. d.	6.40	11.70	3.75	0.65	2.25						99.05	
76 C3. V	47.81	19.10	1.35	8.45	5.10	6.88	3.57	1.98	4.00		2.43	0.63			101.30	
77 B3. IV	47.51	17.81	1.42	8.72	8.05	8.20	3.45	1.21	2.63		2.02				101.02	
78 C4. V	48.15	20.28	1.31	10.01	6.34	0.71	5.30	1.35	6.34						99.79	2.72
79 C3. V	51.52	21.11	8.38	n. d.	2.69	17.49	1.81	0.69	4.00		0.31		0.44	CO ₂ 10.98		
80 C3. V	51.25	19.63	5.07	7.24	5.23	8.61	1.12	0.36	0.81		0.37				99.69	
81 C3. V	49.16	20.52	6.89	7.31	5.64	6.06	1.30	1.01	0.34		0.52		0.78	CO ₂ 0.36	99.89	2.965
82 D4. V	50.01	18.95	n. d.	9.57	5.60	10.44	4.66	2.37	0.39						101.99	
83 C3. V	52.91	21.77	3.47	4.30	2.19	6.82	4.93	2.51	0.91						99.32	
84 C4. V	45.75	13.40	8.21	6.35	7.29	12.05	1.33		1.75		2.95		0.25		99.32	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
65	Gartley, Aberdeenshire, Scotland.	W. Mackie.	W. Mackie, Tr. G. Soc. Edin., VIII, p. 56, 1901.	Diabase porphyrite.	
66	Gatelockside Burn, New Cumnock, Scotland.	J. J. H. Teall.	A. Geikie, G. S. G. B. A. R., 1897, p. 38.	Diabase.	Not in W. T.
67	Newhalls, Queensferry, England.	E. Stecher.	E. Stecher, T. M. P. M., IX, p. 190, 1898.	White trap.	Not fresh. In W. T., p. 441.
68	Cockfield Dike, Great Ayton, England.	W. F. K. Stock.	J. J. H. Teall, Q. J. G. S., XL, p. 224, 1884.	Diabase.	In W. T., p. 241.
69	High Green, Bellingham, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 240, 1884.	Diabase.	In W. T., p. 439.
70	Morpeth, England.	J. E. Stead.	J. J. H. Teall, Q. J. G. S., XL, p. 239, 1884.	Diabase.	In W. T., p. 441.
71	Commune, Meuse River Ardenne. France.	J. de Lapparent.	J. de Lapparent, B. Soc. M. Fr., XXXII, p. 280, 1909.	Diabase.	
72	Pelvoux, Dauphiny.	P. Termier.	P. Termier, C. R., CXXIV, p. 635, 1897.	Diabase.	In W. T., p. 441.
73	Pelvoux, Dauphiny.	P. Termier.	P. Termier, C. R., CXXIV, p. 635, 1897.	Diabase.	In W. T., p. 441.
74	St. Denis de Gatinés, Brittany, France.	Pisani.	L. Vandernotte, Mass. Armor., p. 152, 1913.	Diabase.	
75	Freychinède, Pyrenees.	M. Longchambon.	M. Longchambon, B. Sv. Ct. G. Fr., XXI, No. 131, p. 41, 1912.	Ophite.	
76	L'Arbizon, Pyrenees.	Pisani.	A. de Romeu, B. Soc. M. Fr., XXX, p. 179, 1907.	Diabase.	
77	Lac Bleu, Pyrenees.	Pisani.	A. de Romeu, B. Soc. M. Fr., XXX, p. 164, 1907.	Diabase.	
78	Ajaccio, Corsica.	M. Oels.	M. Oels, Ref. N. J., 1896, I, p. 47.	Diabase.	In W. T., p. 443.
79	Mount Edmund, Spitzbergen.	H. Backlund?	H. Backlund, Ref. N. J., 1911, II, p. 243.	Diabase.	Altered.
80	Andersson Islands, Spitzbergen.	H. Backlund?	H. Backlund, Ref. N. J., II, p. 243, 1911.	Diabase.	
81	Andersson Bay, Spitzbergen.	H. Backlund?	H. Backlund, Ref. N. J., 1911, II, p. 243.	Diabase.	
82	Elsfjeld, Holsenö, Bergen, Norway.	Not stated.	Cited by C. F. Kolderup, Berg. Mus. Aarb., No. 12, p. 36, 1903.	Diallage- labradorite rock.	
83	Holmestrand, Kristiania Fjord, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 28, 1890.	Diabase porphyrite.	In W. T., p. 441
84	Holmestrand, Kristiania Fjord, Norway.	G. Särnström.	W. C. Brögger, Z. K., XVI, p. 27, 1890.	Melaphyre.	In W. T., p. 445.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
85 B4. V	52.69	18.93	10.99	n. d.	2.56	5.31	4.04	2.11	2.76		0.60	0.80			100.79	
86 B4. V	50.95	17.50	14.42	n. d.	2.63	6.85	3.38	1.65	2.02		0.50	0.78			100.68	
87 B4. V	50.65	18.45	13.80	n. d.	2.68	6.22	3.71	1.92	2.02		0.50	0.78			100.73	
88 B4. V	49.20	19.13	13.60	n. d.	3.08	7.18	3.63	1.89	1.31		0.56	0.75			100.33	
89 C2. IV	48.33	16.94	5.65	12.16	4.06	5.91	3.19	1.19	0.83		0.82	1.07	trace		100.15	2.968
90 C2. IV	47.56	16.25	3.41	14.41	4.13	5.15	3.46	1.96	2.33		0.68	1.18	trace		100.52	2.921
91 A4. IV	47.97	11.26	9.09	5.46	3.95	11.76	5.14		2.54		1.68				99.72	
92 D3. V	46.54	16.86	3.20	7.41	9.77	9.54	3.14	0.63	0.69		0.96	trace			98.76	
93 C2. IV	51.11	12.75	6.90	6.81	7.22	5.87	4.67	0.65	1.68		1.28	0.03	trace		98.97	
94 C3. V	49.36	18.52	3.91	10.13	3.37	7.55	3.45	1.89	0.80						98.98	
95 C3. V	49.17	14.59	3.91	12.94	4.32	8.78	3.68	0.79	0.58						98.76	
96 C4. V	47.66	15.59	20.35	n. d.	4.78	6.91	2.24	1.54	0.57						99.64	
97 B3. IV	46.50	13.54	12.39	7.04	6.30	9.60	2.09	1.83							99.29	
98 B3. IV	46.38	12.86	12.08	8.04	6.22	10.55	2.13	1.80							100.63	
99 B3. IV	46.32	12.81	13.06	7.93	6.97	9.03	2.13	1.74							99.99	
100 B3. IV	45.75	12.41	13.23	8.23	5.07	11.41	2.18	1.71							99.94	
101 B3. IV	45.68	11.96	12.78	8.77	5.60	11.21	2.11	1.88	—						99.99	
102 B3. IV	43.74	11.99	17.64	12.20	4.39	7.61	2.19	1.80							100.56	
103 B4. V	45.78	16.65	1.40	10.09	6.41	9.68	3.12		3.40	0.70	2.32			CO ₂ 0.21 SO ₃ 0.75	100.51	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
85	Kullen, Sweden.	L. G. Thomé.	A. Hennig, Ref. N. J., II, p. 59, 1901.	Kullaite.	In W. T., p. 441.
86	Mölle, Kullen, Sweden.	L. G. Thomé.	A. Hennig, Ref. N. J., 1901, II, p. 59.	Konga diabase.	In W. T., p. 441.
87	Bökebolet, Kullen, Sweden.	L. G. Thomé.	A. Hennig, Ref. N. J., 1901, II, p. 59.	Konga diabase.	In W. T., p. 441.
88	Tanga, Kullen, Sweden.	L. G. Thomé.	A. Hennig, Ref. N. J., 1901, II, p. 59.	Olivine diabase.	In W. T., p. 441.
89	Silfberg, Dalarne, Sweden.	O. Larsson.	M. Weibull, Lund. Un. Aars., XXXIII (2), No. 4, p. 24, 1897.	Diabase.	Not in W. T.
90	Silfberg, Dalarne, Sweden.	O. Larsson.	M. Weibull, Lund. Un. Aars., XXXIII (2), No. 4, p. 10, 1897.	Melaphyre.	Not in W. T.
91	Ottfjäll, Sweden.	P. J. Holmquist.	P. J. Holmquist, G. F. F., XVI, p. 190, 1894.	Diabase.	In W. T., p. 441.
92	Krustorp, Brefven, Sweden.	K. Winge.	K. Winge, G. F. F., XVIII, p. 195, 1896.	Olivine diabase.	In W. T., p. 441.
93	Kallioski, Vaajoki, Tervola, Finland.	N. Sahlbom.	V. Hackman, B. C. G. Fin., No. 15, p. 60, 1905.	Diabase.	
94	Föglö, Åland, Finland.	A. Berghell.	B. Frosterus, Fin. G. Und., Bl. 25, p. 23, 1894.	Diabase.	In W. T., p. 441.
95	Föglö, Åland, Finland.	H. Berghell.	B. Frosterus, G. F. F., XV, p. 285, 1893.	Diabase.	In W. T., p. 441.
96	Paljakka, Jaala, St. Michel, Finland.	H. Berghell.	B. Frosterus, G. Ofv. Kt. Fin., Bl. St. Michel, p. 72, 1902.	Diabase.	
97	Sundholm, Nystad, Finland.	Not stated.	H. Gylling, Fin. G. Und., Bl. 12, p. 55, 1888.	Diabase.	Ignited before analysis. In W. T., p. 441.
98	Padoi, Letala, Finland.	Not stated.	H. Gylling, Fin. G. Und., Bl. 12, p. 55, 1888.	Diabase.	Ignited before analysis. In W. T., p. 441.
99	Leinmäki, Letala, Finland.	Not stated.	H. Gylling, Fin. G. Und., Bl. 12, p. 55, 1888.	Diabase.	Ignited before analysis. In W. T., p. 441.
100	Rautavaori, Letala, Finland.	Not stated.	H. Gylling, Fin. G. Und., Bl. 12, p. 56, 1888.	Diabase.	Ignited before analysis. In W. T., p. 441.
101	Heuru, Honkilahti, Finland.	Not stated.	H. Gylling, Fin. G. Und., Bl. 12, p. 56, 1888.	Diabase.	Ignited before analysis. In W. T., p. 441.
102	Kivijärvi, Eura, Finland.	Not stated.	H. Gylling, Fin. G. Und., Bl. 12, p. 56, 1888.	Diabase.	Ignited before analysis. Not fresh. In W. T., p. 441.
103	Höllershagen, Wiblingswerde, Westphalia.	P. Sichtermann.	P. Sichtermann, Jb. Pr. G. L.-A., XXVIII, p. 375, 1910.	Diabase.	Also Ref., N. J., 1907, I, p. 57.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
104 B4. V	44.83	13.47	11.79	4.49	11.60	4.79	2.34	n. d.	6.16						99.47	2.56
105 D3. V	52.40	19.47	4.15	3.80	2.26	8.60	4.45	1.11	2.77		0.19	1.98			101.61	
106 D3. V	48.91	14.31	6.24	5.25	8.91	8.36	4.02	1.45	1.79	1.07	1.71				102.02	
107 B3. IV	45.0	18.7	2.6	10.9	3.6	9.6	2.2	3.1	4.0		0.1				99.8	
108 C3. V	44.74	15.67	5.18	6.71	8.47	8.76	1.79	0.51	3.87		1.69	2.56			99.95	2.83
109 C2. IV	43.69	20.69	3.00	8.91	4.46	11.61	1.41	0.72	2.78	0.16	1.56	0.36		CO ₂ 0.35 SO ₃ 0.51	100.21	2.97
110 B3. IV	48.40	15.33	2.66	11.04	7.06	4.61	1.89	1.39	3.25					CO ₂ 4.94	100.57	
111 C3. V	47.89	12.07	5.73	11.08	6.56	4.94	2.14	1.37	2.99					CO ₂ 6.53	101.30	
112 C4. V	51.87	20.72	7.26	n. d.	1.68	8.12	5.24	1.54	2.76				0.11		99.30	
113 C2. IV	50.76	16.68	5.84	1.69	1.72	10.48	3.27	3.12	1.18		1.64	0.15	0.36	CO ₂ 4.02	100.91	
114 C4. V	50.59	17.81	10.66	n. d.	6.58	6.96	1.05	trace	6.36				trace		100.01	
115 C4. V	45.55	16.30	9.57	n. d.	5.14	7.98	1.24	trace	14.38						99.99	
116 C3. V	47.55	20.43	6.97	4.33	5.89	9.05	3.12	1.49	1.32		trace	trace	0.31	S SrO trace	100.43	2.883
117 C4. V	43.40	17.16	17.56	n. d.	0.25	17.93	0.98	1.09	2.34		trace	trace	0.28	S trace	100.99	3.196
118 C4. V	38.65	9.57	25.35	trace	3.34	18.94	1.13	1.01	1.80		trace	trace	0.55	SrO trace	100.34	3.184
119 B4. V	55.95	19.47	4.09	1.08	4.24	7.84	2.64		3.78		1.60				100.69	2.806
120 C3. V	50.03	15.46	4.25	6.19	7.73	8.25	2.82	1.48	4.28			0.29	0.53		101.31	
121 B3. IV	49.94	18.86	1.47	7.12	5.61	8.54	2.50	1.62	2.77				0.63	CO ₂ 0.23	99.29	2.88
122 C3. V	44.55	23.09	6.47	5.08	5.87	8.90	2.40	0.33	1.06					CO ₂ 2.92	100.66	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
104	Homertshausen, Rheinland?	Not stated.	R. Brauns, N. J. B. B., XXI, p. 310, 1906.	Diabase glass.	
105	Balkhausen, Hesse.	R. Marzahn.	Chelius and Klemm, Erl. G. Kt. Hes., IV, p. 37, 1896.	Diabase.	In W. T., p. 441.
106	Burkhardtsfelden, near Giessen, Hesse.	A. Streng.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 466, 1908.	Trap.	
107	Treisberg, Buchenau, Hesse.	W. Bollenbach.	W. Berkermann, In. Diss. Marb., p. 29, 1910.	Diabase.	
108	Oberberg, Weissenbach, Hesse-Nassau.	H. Harff.	R. Brauns, N. J. B. B., XXVII, p. 276, 1909.	Essexite diabase.	Alkalies uncertain. Cf. ref. P ₂ O ₅ high.
109	Manderbach, Hesse-Nassau.	G. Butzbach.	R. Brauns, N. J. B. B., XXVII, p. 278, 1909.	Mica diabase.	Not fresh.
110	Ronneberg, Thuringia.	C. A. Müller.	C. A. Müller, In. Diss. Gera, p. 32, 1884.	Diabase.	Not fresh. In W. T., p. 443.
111	Ronneberg, Thuringia.	C. A. Müller.	C. A. Müller, In. Diss. Gera, p. 31, 1884.	Diabase.	Not fresh. In W. T., p. 443.
112	Niederkirchen, Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., Bl. Kusel, XX, p. 21, 1910.	Tholeytic gabbro-diabase.	
113	Osbrücken, Kusel, Bavaria.	A. Schwager.	M. Schuster, Erl. G. Kt. Bay., XX, p. 39, 1910.	Melaphyre.	
114	Mannweiler, Pfalz, Bavaria.	P. Weidinger.	M. Schuster, Geog. Jhft., XXVI, p. 242, 1914.	Tholeiyte.	Not fresh.
115	Obermoschel, Pfalz, Bavaria.	P. Weidinger.	M. Schuster, Geog. Jhft., XXVI, p. 242, 1914.	Tholeiyte.	Badly weathered.
116	Neubau, Fichtelgebirge.	Delré?	Delré, In. Diss. Erl., 1895.	Proterobase.	Not in W. T. Osann, II, p. 168.
117	Ochsen Kopf, Fichtelgebirge.	Delré?	Delré, In. Diss. Erl., 1895.	Proterobase.	Not fresh. Not in W. T. Osann, II, p. 168.
118	Ochsen Kopf, Fichtelgebirge.	Delré?	Delré, In. Diss. Erl., 1895.	Proterobase.	Completely epidotized. Not in W. T. Osann, II, p. 168.
119	Zahbelic, n. Prague, Bohemia.	J. Nevole.	B. Macha, Ref. N. J., 1901, I, p. 60.	Diabase.	In W. T., p. 443.
120	Podbaka, Moldauthal, Bohemia.	Strnad.	J. Klevana, Ref. N. J., 1898, I, p. 485.	Olivine diabase.	In W. T., p. 443.
121	Prisednice, near Zbirov, Bohemia.	F. Schulz.	F. Slavik, Ref. N. J., 1901, I, p. 63.	Mica diabase.	In W. T., p. 293.
122	Dobschau, Bohemia.	A. Jilek.	J. Woldrich, B. Ac. Sc. Prag., XVII, p. 387, 1912.	Diabase.	

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
123 B4. V	44.41	19.27	10.77	1.53	4.28	9.25	4.01	2.08	3.11			0.41		FeS ₂ 0.71	100.02	
124 C4. V	54.93	17.73	13.55	n. d.	0.80	4.35	4.94	2.89	0.96				trace		100.15	
125 C3. V	49.50	12.80	16.41	5.80	0.36	6.80	4.41	1.18	2.45	0.75					100.46	
126 C3. V	48.49	13.34	9.72	6.66	2.63	5.86	5.15	2.09	4.63	0.47					99.04	
127 D3. V	43.00	13.25	5.98	6.93	3.29	9.30	6.16	1.96	7.10	0.70		0.95			98.62	
128 D3. V	42.20	17.70	6.62	8.63	4.16	3.60	7.64	4.05	4.27	0.23		trace			99.10	
129 C4. V	49.37	16.19	9.77	n. d.	0.66	13.82	3.20	6.40	0.54						99.95	
130 C3. V	43.41	13.20	7.00	5.66	13.12	12.88	1.84	0.99	3.02						101.12	
131 B3. V	48.50	16.59	7.13	n. d.	7.47	11.50	2.36	0.44	2.70		0.70	0.24		CO ₂ 1.65	99.28	
132 C3. V	45.98	19.93	8.62	6.04	5.46	6.29	3.41	1.29	2.40						99.42	
133 C3. V	45.67	21.01	7.07	4.40	4.52	11.93	1.02	0.82	2.78	0.43	trace				99.65	
134 D3. V	44.59	20.76	7.89	4.72	5.61	11.05	2.96	0.95	3.05		trace				101.58	
135 C4. V	44.45	14.02	14.24	n. d.	9.45	6.54	6.72	0.83	4.14			0.32		CO ₂ 0.45	101.16	2.63
136 D4. V	37.79	18.35	11.79	n. d.	4.69	9.31	9.94	1.89	1.83			0.34	trace	CO ₂ 5.87	101.80	
137 D4. V	50.71	19.04	8.32	n. d.	8.91	6.66	4.03	1.11	3.05		trace	trace			101.83	
138 C4. V	50.66	12.58	n. d.	11.39	6.34	1.90	2.76	3.81	4.60		0.54	trace	1.44		99.32	2.64
139 C3. V	35.94	19.92	2.46	8.30	10.27	14.91	0.76	0.08	6.23	0.10	0.75	trace	1.36		101.11	3.15
140 C2. IV	46.22	22.73	5.34	3.15	5.28	6.06	3.59	0.82	5.38	0.21	0.12	0.03		CO ₂ 1.31 S 0.08	100.32	
141 B3. IV	52.75	12.12	1.36	7.39	11.25	10.56	3.56	0.29	2.26						101.11	
142 D3. V	45.56	14.67	4.61	10.95	7.31	12.08	2.58	0.56	3.90						102.22	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
123	Kozi Oltar, Bohemia.	J. Friedrich.	K. Hinterlechner, Jb. G. R.-A. Wien, LII, p. 188, 1903.	Mica diabase.	
124	Tenczyner Garden, Cracow, Galicia.	R. Zuber.	R. Zuber, Jb. G. R.-A. Wien, XXXV, p. 752, 1885.	Melaphyre.	In W. T., p. 447.
125	Rettenback-Klemm, Schöckel, Styria.	L. Welisch.	L. Welisch, Mt. Nw. Ver. Steierm., XLVII, p. 75, 1911.	Diabase.	
126	Rettenback-Klemm, Schöckel, Styria.	L. Welisch.	L. Welisch, Mt. Nw. Ver. Steierm., XLVII, p. 76, 1911.	Diabase.	
127	Hochlautsch, Styria.	L. Welisch.	L. Welisch, Mt. Nw. Ver. Steierm., XLVII, p. 66, 1911.	Diabase.	
128	Hochlautsch, Styria.	L. Welisch.	L. Welisch, Mt. Nw. Ver. Steierm., XLVII, p. 65, 1911.	Diabase.	
129	Boscampo, Predazzo, Tyrol.	J. A. Ippen.	J. A. Ippen, N. J. Cb., p. 640, 1903.	Melaphyre.	
130	Palle Rabiose, Monzoni, Tyrol.	C. Doelter.	C. Doelter, Anz. Ak. W. Wien, XXXIX, p. 231, 1902.	Melaphyre.	
131	Bischofsjoch, Kitzbühler Alpen, Tyrol.	L. Obermaier.	A. Spitz, T. M. P. M., XXVIII, p. 504, 1909.	Hornblende diabase.	
132	Galleno, Adamello, Tyrol.	C. Riva.	C. Riva, Ref. N. J., II, p. 65, 1887.	Diabase.	In W. T., p. 443.
133	Cadin Brut, Fassa Thal, Tyrol.	H. Proboscht.	H. Proboscht, N. J. Cb., p. 47, 1905.	Melaphyre.	
134	Pizmeda, Tyrol.	H. Proboscht.	H. Proboscht, N. J. Cb., p. 80, 1904.	Analcite melaphyre.	
135	Nozza, Val Sabbia, Piedmont.	C. Riva.	C. Riva, Rend. Inst. Lomb., XXVI, p. 433, 1893.	Olivine diabase.	Not fresh. In W. T., p. 443.
136	Colmo di Provoglio, Val Sabbia, Piedmont.	C. Riva.	C. Riva, Rend. Inst. Lomb., XXVI, p. 435, 1893.	Olivine melaphyre.	Not fresh. In W. T., p. 447.
137	Romito, near Livorno, Tuscany.	E. Manasse.	E. Manasse, Pr. Soc. Tosc., XII, p. 165, 1901.	Diabase.	
138	Gropo del Vescovo, near Parma, Italy.	M. Ferrari.	M. Ferrari, Mem. Ac. Linc. (5), VIII, No. 21, p. 733, 1911.	Diabase.	
139	Gorgona Island, Tuscan Archipelago.	E. Manasse.	E. Manasse, Mem. Soc. Tosc., XX, p. 50, 1904.	Diabase.	Altered.
140	Paraspora, Monte Scalpello, Madonie, Sicily.	G. Ponte.	G. Ponte, Mem. Ac. Linc. (5), VII, No. 10, p. 622, 1909.	Diabase.	Not fresh. 3 decimals.
141	Malinka-Sosnowka, Koswinsky, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 189, 1902.	Diabase.	
142	Kroutoi-Ouwal, Koswinsky, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 189, 1902.	Diabase.	Tilaite in Oural Nord, II, p. 440, 1905.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
143 B3. IV	51.02	13.62	2.67	9.86	6.01	11.42	2.16	0.53	2.48		1.38		trace		101.15	
144 D3. V	55.08	15.18	4.68	6.86	3.96	5.45	1.93	0.43	2.02		0.23		3.54		99.36	
145 D3. V	41.98	22.68	4.87	7.28	1.98	5.93	4.57	0.27	4.09		trace		4.91		98.56	
146 D4. V	49.92	14.84	11.93	n. d.	3.84	10.50	5.72		3.25						100.00	
147 C4. V	57.67	24.37			3.05	8.02	2.93	1.12	3.48						100.64	
148 C4. V	52.61	18.94	9.60	n. d.	3.56	9.14	2.62	0.86	3.27						99.70	
149 C4. V	51.96	20.47	9.55	n. d.	2.27	4.14	3.90	2.15	5.65						100.08	
150 C4. V	49.99	15.11	14.25	n. d.	4.11	6.04	3.52	1.42	4.78						99.77	
151 C4. V	49.02	20.25	9.30	n. d.	3.32	8.26	4.09	1.52	4.30						100.07	2.80
152 D4. V	49.71	17.45	6.56	n. d.	7.01	10.76	3.74	3.24	1.82						101.29	
153 B3. IV	49.19	16.83	1.96	8.15	7.50	12.38	3.24	1.41							100.66	
154 B3. IV	47.15	16.09	4.59	9.49	4.43	8.86	4.46	0.39	2.39	0.29	1.32				99.46 (100.61)	
155 C4. V	45.78	21.23	9.57	n. d.	5.81	8.06	3.57	2.71	3.45						100.18	
156 C4. V	53.27	19.33	8.71	trace	2.33	5.19	3.84	1.80	3.84	1.67					100.00	
157 D4. V	52.89	20.88	7.10	n. d.	3.13	12.82	(2.55)		0.63						100.00	
158 B4. V	52.44	12.16	13.79	n. d.	7.40	10.46	1.90	0.49	1.89						100.53	
159 C3. V	53.00	19.70	10.93	2.88	4.00	7.20	0.82	0.79	n. d.			trace	trace	CO ₂ FeS ₂ 0.25	99.57	2.864
160 C3. V	52.20	16.50	14.50	1.20	3.50	11.50	0.28	0.25	n. d.			trace		S trace	99.93	
161 C3. V	51.20	16.75	16.87	2.88	2.60	8.74	0.50	0.39				trace	trace	CO ₂ FeS ₂ 0.02	99.95	2.834
162 B3. IV	51.75	14.67	6.27	4.73	5.19	11.94	2.70	0.58	1.86						99.69	
163 C4. V	49.50	18.40	13.10	n. d.	5.25	2.24	4.65	1.48	5.23						99.95	

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
143	Pelia Ravine, Wichera, Ural Mountains.	Not stated.	Duparc, Pearce, and Tikanovitch, Oural Nord, III, p. 66, 1909.	Diabase.	
144	Drugoretzkaja Schtschalga, Olonez, Russia.	S. A. Jakowseff.	Cited by W. Wahl, Fennia, XXIV, No. 3, p. 50, 1908.	Diabase.	
145	Drugoretzkaja Schtschalga, Olonez, Russia.	S. A. Jakowseff.	Cited by W. Wahl, Fennia, XXIV, No. 3, p. 50, 1908.	Microvariolite.	
146	Jalguba, Olonez, Russia.	Loewinson-Lessing.	Loewinson-Lessing, T. M. P. M., VI, p. 294, 1885.	Diabase aphanite.	Alkalies by difference. In W. T., p. 443.
147	Koktebel, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int. VII, Guide XXXIII, p. 27, 1897.	Melaphyre.	In W. T., p. 447.
148	Kobosa, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int. VII, Guide XXXIII, p. 27, 1897.	Melaphyre.	In W. T., p. 447.
149	Karagatch, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int. VII, Guide XXXIII, p. 27, 1897.	Melaphyre.	In W. T., p. 447.
150	Bodrak River, Crimea.	A. Lagorio.	A. Lagorio, Cong. G. Int. VII, Guide XXXIII, p. 27, 1897.	Melaphyre.	In W. T., p. 447.
151	Mount Kastel, Crimea.	R. Prendel.	R. Prendel, Ref. N. J., 1887, II, p. 98.	Melaphyre.	In W. T., p. 447.
152	Sejovica, near Sofia, Bulgaria.	L. Dimitrow.	L. Dimitrow, Ds. Ak. W. Wien, LX, p. 514, 1893.	Epidiabase.	In W. T., p. 443.
153	Assa, Caucasus.	Loewinson-Lessing and Krikmeyer.	Loewinson-Lessing, Ref. N. J., 1899, II, p. 234.	Diabase.	In W. T., p. 443.
154	Krasnaja Poljana, Caucasus.	D. Beljankin.	D. Beljankin, An. Inst. Pol. Pet. G. T., XV, p. 371, 1911.	Albite diabase.	
155	Kolotanis, Caucasus.	Makerow.	Loewinson-Lessing, Ref. N. J., 1899, II, p. 234.	Diabase.	In W. T., p. 443.
156	Aspinsi, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 156, 1888.	Melaphyre.	SiO ₂ includes loss, 3 decimals. Not in W. T.
157	Mujongo, Uganda.	A. Roccati.	A. Roccati in Duca Abruzzi, Ruwenzori, p. 179, 1909.	Diabase.	Other analyses in same work.
158	Pietermaritzburg, Natal.	G. Bauzel.	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine diabase.	In W. T., p. 445.
159	Klipriversberg, Transvaal.	H. Eckstein & Co.	C. B. Horwood, Tr. G. Soc. S. Afr., XIII, p. 39, 1911.	Diabase.	
160	East Rand, Transvaal.	H. Eckstein & Co.	C. B. Horwood, Tr. G. Soc. S. Afr., XIII, p. 39, 1911.	Diabase.	
161	Grootvlei, East Rand, Transvaal.	H. Eckstein & Co.	C. B. Horwood, Tr. G. Soc. S. Afr., XIII, p. 39, 1911.	Diabase.	
162	Near Kimberley, Griqualand.	Dodge (student).	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine diabase.	In W. T., p. 337.
163	Kimberley, Griqualand.	Not stated.	L. de Launay, C. R., CXXV, p. 336, 1897.	Olivine diabase.	In W. T., p. 445.

DIABASE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
164 C4. V	46.60	16.90	11.60	n. d.	9.35	2.76	4.67	0.63	7.12						99.74	
165 B3. IV	51.82	13.55	10.07	2.85	7.35	10.86	2.52	0.23	1.40						100.65	
166 B3. IV	49.50	14.89	5.93	6.42	6.73	12.45	1.68	0.56	2.84						101.00	
167 D3. V	56.63	11.24	12.66	5.20	3.15	6.38	3.97	1.24	2.08						102.55	
168 D3. V	53.04	12.45	9.60	3.35	6.07	10.23	5.36	0.25	2.27						102.62	
169 C3. V	50.17	15.83	9.32	4.87	7.21	9.34	3.00	0.71	0.74						101.19	
170 B4. V	50.44	18.25	n. d.	8.93	7.86	7.14	3.25	0.64	3.01						99.52	
171 B4. V	48.31	18.51	14.53	n. d.	4.45	5.40	3.42	1.82	3.88						100.32	
172 C4. V	47.51	16.00	16.26	n. d.	7.38	7.63	2.29	1.01	3.25						101.33	
173 D3. V	54.00	18.15	4.07	8.05	3.37	5.01	2.82	1.31	1.77				CO ₂ 0.20		98.75	
174 D3. V	46.05	21.20	5.08	7.99	2.73	10.40	1.43	0.17	2.03		1.19				98.27	
175 C3. V	35.18	14.55	4.01	7.88	8.10	9.60	4.25	2.21	2.57				CO ₂ 12.61		100.96	
176 C2. IV	50.41	19.11	1.97	9.58	6.23	7.42	1.37	0.74	0.94	0.09	2.14	0.10	0.11	NiO 0.01 BaO 0.07	100.29	
177 C3. V	49.66	21.29	5.94	2.19	6.47	9.16	2.28	0.32	2.78						100.09	2.84
178 B4. V	48.12	17.80	8.34	n. d.	8.40	7.78	2.05	0.25	6.36				0.95		100.05	
179 B4. V	48.55	14.38	n. d.	10.73	11.69	12.65	1.42	0.29	0.46				0.11		100.28	
180 C3. V	61.08	14.15	6.77	1.08	3.87	8.14	1.17	0.21	3.71		trace	0.10	0.96		101.24	2.86
181 C4. V	50.22	19.41	8.15	n. d.	7.14	10.20	3.84	1.20	1.10						101.26	
182 C3. V	40.62	22.12	5.36	9.57	4.05	2.20	1.32	1.32	2.92	4.65			CO ₂ 8.74		100.87	
183 C3. V	50.98	17.09	0.87	8.35	4.70	9.70	4.09	0.10	1.08	0.05	0.79		1.25	CO ₂ none FeS ₂ 0.19	99.24	2.95

DIABASE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
161	Kimberley, Griqualand.	Not stated.	L. de Launay, C. R., CXXV, p. 336, 1897.	Olivine diabase.	In W. T., p. 445.
165	Between Oranje and Rietfluss, Orange River Colony.	Ehrhardt and Schwedes (students).	E. Cohen, N. J. B. B., V, p. 233, 1887.	Olivine diabase.	In W. T., p. 311.
166	Philipolis, Orange River Colony.	Liepmann (student).	E. Cohen, N. J. B. B., V, p. 244, 1887.	Diabase porphyrite.	In W. T., p. 337.
167	Colesburg, Cape Colony.	Trechmann and Ambühl (students).	E. Cohen, N. J. B. B., V, p. 237, 1887.	Quartz diabase.	In W. T., p. 445.
168	Richmond, Cape Colony.	Raincke and Reuling (students).	E. Cohen, N. J. B. B., V, p. 247, 1887.	Diabase porphyrite.	In W. T., p. 445.
169	Pfandstall, near Colesberg, Cape Colony.	Wetzig (student).	E. Cohen, N. J. B. B., V, p. 245, 1887.	Diabase porphyrite.	In W. T., p. 337.
170	Purikan, Persia.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XXXIV, p. 133, 1884.	Olivine melaphyre.	In W. T., p. 447.
171	Maschur Spring, Firuskuh, Persia.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XXXIV, p. 121, 1884.	Diabase.	In W. T., p. 443.
172	Buhemin, Elburz Mountains, Persia.	E. Drasche.	E. Drasche, Vh. G. R.-A. Wien, 1884, p. 196.	Olivine diabase.	In W. T., p. 445.
173	Angara River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 363, 1910.	Mica diabase.	
174	Rybnaya River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 332, 1910.	Gabbro- diabase.	
175	Murozhuaya River, Jenissei District, Siberia.	Not stated.	A. Meister, Reg. Aurif. Sib., IX, p. 376, 1910.	Mica diabase.	Not fresh.
176	Kusjkin Island, Siberia.	H. Backlund.	H. Backlund, Mem. Ac. Sc. St. P., XXI, No. 6, p. 15, 1910.	Diabase.	
177	Tukchi River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 56.	Diabase.	
178	Nemerikan River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 56.	Gabbro- diabase.	
179	Dicksons Harbor, Siberia.	Lindström.	Lindström, Ref., N. J., 1885, I, p. 430.	Olivine diabase.	In W. T., p. 445.
180	Ta-thung-ho River, Nan Shan, China.	C. Pfeil.	K. Futterer, Durch. Asien, II (2), p. 45, 1909.	Diabase porphyrite.	
181	Hinazuru Pass, Kai, Japan.	B. Koto.	B. Koto, Q. J. G. S., XI, p. 456, 1884.	Diabase.	In W. T., p. 445.
182	Pitfield Plains, Victoria.	Mining department.	S. B. Hunter, Vict. Dep. Min., Spec. Rep., 1901, p. 13.	Dike rock (diabase?).	Not fresh.
183	Leonora, Western Australia.	C. C. Williams.	C. F. V. Jackson, W. Aust. G. S. B. 13, p. 19, 1904.	"Greenstone."	

BASALT.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp.gr.
1 B3. IV	45.20	19.08	3.64	14.64	4.98	7.89	3.32	1.08	n. d.						99.83	
2 D3. V	40.25	13.62	5.46	10.36	8.86	10.31	1.96	0.59	0.74		6.53				98.68	
3 B3. IV	41.28	18.48	9.44	8.20	7.49	7.04	3.52	2.21	2.74						100.40	
4 D4. V	44.93	18.32	8.70	21.09	0.47	1.41	2.12	0.58	trace		2.92			CO ₂ trace	100.54	
5 D4. V	39.22	4.93	18.12	5.90	3.61	19.29	2.51	0.68	0.21		3.49			CO ₂ 1.24	99.20	
6 C3. V	44.85	20.63	6.91	5.10	6.27	8.69	3.28	2.65	1.15	0.69			0.41		100.63	
7 C4. V	47.35	34.38			4.43	8.27	2.55	1.33	0.95						99.26	
8 A4. IV	55.68	18.93	n. d.	8.73	4.86	7.99	2.12	0.48	0.60						99.39	
9 A4. IV	51.92	19.76	11.21	n. d.	3.38	9.30	2.16	0.60	1.54						99.87	
10 A4. IV	51.66	11.22	7.62	n. d.	13.61	7.72	5.98	0.89	1.06		trace		0.12		100.13	
11 C3. V	49.45	17.58	3.41	3.41	4.05	7.20	5.83	1.57	4.34		2.23		trace		99.07	2.738
12 B3. IV	48.03	21.81	2.25	6.04	6.11	9.15	4.58	0.44	2.16		trace	0.33			100.90	2.82
13 C3. V	52.18	15.44	4.26	5.10	8.89	8.57	2.11	0.55	2.16		trace	trace			99.26	2.848
14 C4. V	49.52	21.20	4.21	6.48	3.62	8.46	2.08	0.88	1.38		1.55	0.25			99.63	
15 B3. IV	52.02	17.14	7.96	3.52	3.13	11.57	2.38	0.60	0.28			trace	0.85	SO ₃ trace Cl trace	99.45	2.76
16 D4. V	47.95	23.75	12.72	n. d.	1.90	7.86	1.82	0.35	1.91						98.26	
17 C4. V	45.51	15.82	15.31	n. d.	3.98	9.26	4.98	2.99	0.48						100.00	2.836
18 C4. V	53.03	20.09	9.43	n. d.	2.63	6.05	4.52	1.27	2.64						99.66	
19 C4. V	48.30	20.06	1.29	10.15	5.21	10.10	2.80		2.00						99.91	
20 C4. V	46.68	18.89	8.74	7.95	5.36	10.00	1.96		0.40						99.98	2.90

BASALT.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Cross Lake, Cobalt, Ontario.	Not stated.	W. G. Miller, Rep. Bur. Min. Ont., XIV (II), p. 50, 1906.	Basalt.	
2	Littleton, New Hampshire.	G. W. Hawes.	G. W. Hawes, A. J. S., XII, p. 136, 1876.	Metadolerite.	Not in W. T.
3	Russell mine, South Mountain, Pennsylvania.	C. H. Henderson.	C. H. Henderson, Tr. Am. Inst. M. E., XII, p. 82, 1884.	Basalt.	In W. T., p. 301.
4	Alum Hill, Boulder County, Colorado.	C. I. Andrews.	C. I. Andrew, Fr. Col. Sc. Soc., V, p. 151, 1895.	Basalt.	In W. T., p. 447.
5	Alum Hill, Boulder County, Colorado.	C. I. Andrews.	C. I. Andrews, Fr. Col. Sc. Soc., V, p. 150, 1895.	Basalt.	In W. T., p. 447.
6	Mount Franklin, Talbot County, Victoria, British Columbia.	F. G. Wait.	G. C. Hoffman, Can. G. S. A.-R., VI, p. 31 R, 1895.	"Lava" (basalt?).	In W. T., p. 301.
7	Walla Walla, Washington.	G. P. Merrill.	G. P. Merrill, U. S. G. S. W. S. P. 53, p. 44, 1903.	Basalt.	Also in W. Lindgren, U. S. G. S. P. P. 27, p. 95, 1904.
8	Mount Thielson, Oregon.	F. W. Clarke.	J. S. Diller, A. J. S., XXVIII, p. 257, 1884.	Hypersthene basalt.	For fulgurite see ref. In W. T., p. 447.
9	Pit River, Lassen Peak, California.	F. W. Clarke.	J. S. Diller, U. S. G. S. B. 148, p. 200, 1897.	Basalt.	In W. T., p. 447.
10	Knoxville, California.	W. H. Melville.	G. F. Becker, U. S. G. S. Mon. 13, p. 159, 1888.	Basalt.	In W. T., p. 447.
11	Point Bonita, Marin County, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 106, 1893.	Basalt.	In W. T., p. 447.
12	Grizzly Peak, Berkeley Hills, California.	C. Palache.	Lawson and Palache, B. Dep. G. Un. Cal., II, p. 434, 1901.	Basalt.	
13	Cerro San Miguel, Atlixco, Puebla, Mexico.	A. Röhrig.	A. Hoppe in Felix and Lenk, Btr. G. Mex., II, p. 213, 1899.	Basalt.	In W. T., p. 333.
14	Near Le Marin, Martinique, West Indies.	Pisani.	A. Lacroix, Mount Pelée, p. 573, 1904.	Basalt.	
15	Portanuela, Yate Volcano, Patagonia.	H. Ziegenspeck.	H. Ziegenspeck. In. Diss. Jena, p. 29, 1883.	Basalt.	In W. T., p. 249.
16	Laugervatus, Iceland.	R. Bréon.	R. Bréon, G. Islande, p. 37, 1884.	Basalt glass.	In W. T., p. 449.
17	Mary Muss Bay, Jan Mayen.	R. Scharitzer.	R. Scharitzer, Jb. G. R.-A. Wien, XXXIV, p. 718, 1884.	Basalt.	In W. T., p. 447.
18	Ardtun, Mull, Scotland.	G. A. J. Cole.	G. A. J. Cole, Q. J. G. S., XLIV, p. 303, 1888.	Tachylite.	In W. T., p. 449.
19	Ob Alt an Daraich, Kyleakin, Skye, Scotland.	T. Baker.	A. Harker, Rocks of Skye, p. 322, 1904.	Dolerite.	
20	Allt na Nighinn, Kyleakin, Skye, Scotland.	T. Baker.	A. Harker, Rocks of Skye, p. 322, 1904.	Dolerite.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
21 C3. V	51.10	22.05	1.21	5.89	2.35	11.42	2.22	1.02	0.71			0.58		CO ₂ 1.82	99.97	
22 C4. V	59.15	14.54	12.31	n. d.	1.97	trace	4.01	6.56	1.51			trace			100.05	2.68
23 D4. V	45.95	7.23	n. d.	25.02	1.71	5.17	5.91	1.51	6.14	0.39	1.08	0.38			100.49	
24 D4. V	42.21	9.47	n. d.	23.40	2.16	6.20	5.30	1.76	7.18	0.35	1.57	0.51			100.11	
25 C3. V	43.23	21.37	1.69	9.53	3.57	6.66	5.63	trace	4.49			0.97	trace	CO ₂ 2.61 FeS ₂ 9.33	100.08	2.82
26 D4. V	52.29	17.33	11.14	n. d.	2.62	6.47	4.24	2.40	3.27				0.66		100.72	
27 D4. V	35.42	25.68	10.56	n. d.	n. d.	1.96	n. d.	n. d.	9.59	11.23	4.80				99.24	
28 C3. V	53.08	21.41	3.60	5.84	3.11	6.90	3.68	1.55	(0.71)		1.24				100.41	2.821
29 C4. V	50.67	19.43	2.30	7.26	6.01	9.42	3.67	0.93	(0.66)		0.88				100.62	3.024
30 D4. V	49.94	19.62	5.95	4.89	5.05	7.92	3.38	2.26	(0.88)		2.54				101.55	2.98
31 C3. V	46.71	22.01	4.03	7.00	3.78	10.93	2.74	0.67	(0.21)		2.49				100.36	3.068
32 C4. V	49.00	21.70	13.30	n. d.	5.22	8.95	0.63	1.95	n. d.						100.75	
33 C4. V	47.23	24.25	11.33	n. d.	4.85	8.47	1.81	1.64	n. d.						99.58	
34 D4. V	44.50	21.50	14.90	n. d.	7.60	8.96	1.36	2.47	n. d.						101.26	
35 D4. V	44.27	29.82			5.83	11.69	3.29	1.94	2.51						99.35	2.864
36 B3. IV	46.82	14.31	11.14	1.92	7.50	9.03	4.43	2.22	0.16			1.85			99.38 (99.365)	
37 B3. IV	46.46	18.70	6.72	3.35	5.85	9.72	2.55	1.36	4.13			0.65			99.49 (99.470)	
38 B3. IV	44.29	14.14	3.84	8.60	9.20	9.10	6.72	3.15	0.58			0.48			100.20 (100.103)	
39 D4. V	47.54	17.70	5.19	6.20	5.94	9.12	4.01	1.43	0.72		trace	0.62		CO ₂ 0.10 SO ₃ trace Cl 0.07	98.64	2.79
40 D4. V	48.0	23.0	16.5	n. d.	0.8	5.0	1.0	n. d.	3.2		1.5				99.0	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
21	Eycott Hill, Lake District, England.	J. Hughes.	Cited in J. J. H. Teall, Brit. Petrog., p. 228, 1888.	Lava (basalt?).	In W. T., p. 449.
22	Garn Fawr, near Fishguard, Pembrokeshire, Wales.	F. E. Tadman.	F. R. C. Reed, Q. J. G. S., LI, p. 192, 1895.	Tachylyte.	In W. T., p. 423.
23	Dinas Head, Cornwall.	J. J. Beringer.	H. Fox, Tr. R. Soc. Corn., XII, p. 71, 1896.	Dolerite.	In W. T., p. 449.
24	Round Hole Point, Cornwall.	J. J. Beringer.	H. Fox, Tr. R. Soc. Corn. XII, p. 71, 1896.	Dolerite.	In W. T., p. 449.
25	Pentire Point, Cornwall.	Phillips.	J. J. H. Teall, Brit. Petrog., p. 231, 1888.	Lava (basalt?).	Not fresh. In W. T., p. 449.
26	The Beal, Portree, Ireland.	Hodgkinson.	Judd and Cole, Q. J. G. S., XXXIX, p. 455, 1883.	Basalt glass.	In W. T., p. 449.
27	Giants Causeway, Ireland.	D. Jardin.	G. A. J. Cole, G. S. Irel. Mem., p. 113, 1912.	Basalt.	Altered.
28	La Morangie, Puy-de-Dome, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 342, 1902.	Basalt.	
29	Seriers, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 344, 1902.	Basalt.	
30	Puy de la Croix, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 347, 1902.	Basalt.	
31	Bouzenties, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 346, 1902.	Basalt.	
32	Banne d'Ordenche, Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXXVIII, p. 1097, 1899.	Basalt.	In W. T., p. 449.
33	Puy Louh, Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXXVIII, p. 1097, 1899.	Basalt.	In W. T., p. 449.
34	Banne d'Ordenche, Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXXVIII, p. 1097, 1899.	Basalt.	In W. T., p. 449.
35	La Croix-Morand, Mont Dore, Auvergne.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 479, 1887.	Dolerite.	In W. T., p. 449.
36	San Feliu de Pallarols, Catalonia, Spain.	Fages.	L. Fernandez-Navarro, Mem. Soc. Esp. H. N., IV (5), p. 410, 1907.	Basalt.	3 decimals.
37	Mallorquinas, near Olot, Catalonia, Spain.	Fages.	L. Fernandez-Navarro, Mem. Soc. Esp. H. N., IV (5), p. 410, 1907.	Basalt.	Altered. 3 decimals.
38	Montolivet, near Olot, Catalonia, Spain.	Fages.	L. Fernandez-Navarro, Mem. Soc. Esp. H. N., IV (5), p. 410, 1907.	Basalt.	3 decimals.
39	Senoreta, Columbretes Islands, Spain.	R. Pfohl.	F. Becke, T. M. P. M., XVI, p. 310, 1896.	Basalt.	In W. T., p. 449.
40	Alboran Island, Spain.	S. Traverso.	S. Traverso, Gior. Min., V, p. 203, 1894.	Labradorite (basalt).	In W. T., p. 449.

BASALT--Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
41 C2.IV	51.65	13.41	8.45	2.79	3.60	8.17	3.90	1.58	0.14		3.37	1.07		CO ₂ trace SO ₃ 1.28	99.41	
42 C3.V	51.82	18.11	4.92	3.80	3.68	7.55	3.79	6.11	0.71						100.49	
43 D4.V	50.91	18.45	11.87	n. d.	4.46	7.64	4.45	2.72	1.49						101.99	
44 D4.V	50.36	16.83	13.27	n. d.	4.78	8.34	4.79	2.20	1.56						102.13	
45 C3.V	48.93	22.63	8.84	1.97	3.54	7.27	4.32	2.04	0.36		trace	trace	0.50		100.40	
46 B3.IV	48.56	15.65	5.17	6.42	6.95	8.89	3.73	1.24	0.28			1.31		CO ₂ 1.07	99.27	
47 D4.V	47.55	14.82	n. d.	11.63	5.90	9.16	3.87	4.39			2.68				100.00	
48 D4.V	47.14	15.67	n. d.	11.17	3.60	11.85	2.90	2.20			4.00				100.00	
49 D4.V	46.57	16.10	n. d.	12.02	4.14	13.67	2.14	0.84			3.80				99.28	
50 D4.V	44.49	13.35	n. d.	13.75	5.59	12.90	1.39	2.00	3.25		2.48	0.45			100.01	
51 C4.V	23.65	6.68	6.34	n. d.	6.74	25.41	1.03	0.87	9.89			0.28		CO ₂ 19.46	100.35	
52 D4.V	20.70	5.20	8.08	n. d.	2.93	30.49	n. d.	n. d.	7.10		1.20	0.70		CO ₂ 22.60	98.00	
53 C4.V	52.87	16.36	10.87	n. d.	5.23	7.94	3.64	0.96	1.22						99.09	
54 B3.IV	45.94	21.16	2.21	7.14	7.80	10.49	3.21	1.14	1.02						100.11	2.982
55 D2.V	45.21	7.82	3.41	8.08	8.43	12.31	6.64	2.94	1.82		1.69	0.52		SO ₂ 0.56	99.43	
56 B3.IV	44.97	17.48	12.80	0.44	4.06	10.80	3.21	1.38	2.12		2.47				99.73	
57 C2.IV	41.71	15.80	5.59	7.64	4.85	10.30	6.08	1.00	2.22		2.77	trace	0.16	CO ₂ 2.01 X 0.74 SO ₃ 0.12 Cl 0.46	101.45	2.900
58 C2.IV	51.68	20.12	5.17	1.08	4.10	6.49	3.36	1.56	4.30		1.56	1.11			100.53	
59 C2.IV	44.64	20.63	11.60	2.98	0.47	9.47	3.20	1.75	2.90		2.31	0.81			100.76	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rockname.	Remarks.
41	Staufenberg, Wesergebiet, Rheinland.	P. Jannasch.	F. Rinne, Jb. Pr. G. L.-A., XIII, p. 79, 1893.	Basalt.	In W. T., p. 281.
42	Schurkopf, Siebengebirge.	Hübner (student).	H. Laspeyres, Vh. Nh. Ver. Bonn., LVII, p. 561, 1900.	Hornblende basalt.	Not in W. T.
43	Löwenburg, Siebengebirge.	Fels.	H. Laspeyres, D. Siebengeb., p. 190, 1901.	Hornblende basalt.	
44	Löwenburg, Siebengebirge.	H. Laspeyres.	H. Laspeyres, D. Siebengeb., p. 188, 1901.	Dolerite.	
45	Kirmessplatz, Siebengebirge.	E. Kaiser?	E. Kaiser, Vh. Nh. Ver. Bonn., LIV, p. 186, 1897.	Basalt.	In W. T., p. 449.
46	Lyngsberg, near Mehlem, Rheinland?	W. V. Kohnen.	W. V. Kohnen, Ref. N. J., II, p. 197, 1908.	Basalt.	
47	Schelingen, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, p. 277, 1892.	Basalt.	Calculated to 100, 2.19 H ₂ O and 5.00 CaCO ₃ de- ducted. In W. T., p. 451.
48	Sponeck, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, p. 277, 1892.	Basalt.	Calculated to 100, 4.25 H ₂ O deducted. In W. T., p. 451.
49	Sponeck, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, p. 278, 1892.	Basalt.	Calculated to 100, 3.27 H ₂ O deducted. In W. T., p. 451.
50	Schönberg, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserstuhl, p. 308, 1892.	Basalt tuff.	In W. T., p. 451.
51	Schafberg, Schwäbische Alb, Württemberg.	E. Gaiser.	E. Gaiser, In. Diss. Bres., p. 37, 1904.	Basalt tuff.	
52	Randecker Maar, Schwäbische Alb, Württemberg.	E. Gaiser.	E. Gaiser, In. Diss. Bres., p. 37, 1904.	Basalt tuff.	
53	Schwarzenfels, Rhöngelbirge.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 479, 1887.	Basalt glass.	In W. T., p. 451.
54	Veitenfeld, Kreuzberg, Rhöngelbirge.	E. v. Seyfried.	E. v. Seyfried, Jb. Pr. G. L.-A. (1896), XVII, p. 26, 1897.	Basalt.	In W. T., p. 291.
55	Rote Moose, Bischofsheim, Rhöngelbirge.	K. Endell.	K. Endell, N. J. B. B., XXXI, p. 18, 1911.	Basalt.	
56	Zernberg, Rhöngelbirge.	Dürfeld.	H. Bücking, Sb. Pr. Ak. W., 1910, p. 494.	Basalt.	
57	Dachberg, Rhöngelbirge.	P. Jannasch.	F. Rinne, Jb. Pr. G. L.-A., VII, p. 9, 1887.	Basalt.	In W. T., p. 451.
58	Kottenhain, near Niederhain, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 14.	Enstatite dolerite.	Same mass as next two. Not fresh.
59	Kottenhain, near Niederhain, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 14.	Enstatite dolerite.	Same specimen as next number. Not fresh.

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
60 D2. V	44.60	20.37	12.41	2.87	4.30	6.90	1.86	1.46	4.12		1.99	0.56			101.24	
61 D2. V	47.77	19.49	8.60	2.87	6.11	9.63	1.87	1.01	1.86		1.24	0.74			101.19	
62 D2. V	46.68	12.75	7.41	4.76	9.74	10.15	2.09	0.94	1.74	0.51	1.98				98.75	
63 D3. V	46.21	14.43	4.24	7.20	9.82	6.16	3.65	1.20	2.05	0.92	1.72				97.60	
64 C2. IV	45.44	20.04	3.36	7.38	6.91	9.20	1.59	1.28	1.83	1.20	1.16	0.52		CO ₂ 0.01 SO ₂ 0.03	99.95	
65 D3. V	43.64	11.64	4.01	7.26	12.25	10.00	2.03	0.87	3.60	1.00	2.33				98.63	
66 D3. V	43.16	14.23	2.74	6.82	11.75	10.72	3.46	1.11	1.91	0.41	2.22				98.53	
67 C4. V	41.96	11.63	4.59	7.33	11.87	13.39	4.84		1.80		0.60	0.66		CO ₂ 0.78	99.45	
68 D3. V	41.32	13.60	5.83	9.26	11.02	11.55	3.61	1.89	2.79		0.34	0.28		CO ₂ 0.34	101.83	
69 D3. V	41.17	12.35	6.29	8.02	9.70	11.09	3.60	1.97	2.77			1.16		CO ₂ 0.98	99.10	
70 C2. IV	52.21	14.62	10.77	3.20	5.02	8.72	1.77	0.55	0.09		1.36	0.52		CO ₂ 0.19	99.02	
71 C2. IV	49.06	13.66	7.55	4.00	8.45	8.90	4.03	1.00	1.30		2.93	0.31			101.19	
72 D3. V	47.39	11.54	12.47	7.13	6.24	8.83	3.80	0.73	2.79			0.97		CO ₂ 0.18	102.07	
73 D2. V	44.64	16.14	19.35	2.52	0.96	10.78	1.65	2.24	0.27		0.78		0.61	CO ₂ 0.13 SO ₂ 0.16 Cl trace	100.23	2.794
74 D4. V	43.65	33.23			2.03	8.70	5.43	6.48	0.61						100.13	
75 C2. IV	40.52	18.97	10.77	2.99	6.72	11.34	3.40	0.42	2.40	0.81	0.26	0.74		SO ₂ 0.62 Cl 0.15	100.11	2.958
76 C2. IV	40.02	19.88	11.68	1.61	4.03	12.52	2.93	0.57	3.49	1.31	0.24	0.82		SO ₂ 0.61 Cl 0.09	99.80	2.884
77 C2. IV	53.83	15.85	6.87	4.09	5.56	7.68	3.02	0.72	0.84		1.73	0.26	0.21	CO ₂ 0.32 X 0.61 SO ₂ trace Cl 0.05	101.64	2.911
78 D2. V	49.05	14.36	4.25	6.35	8.38	8.38	3.42	2.26	1.57		2.18	0.09	0.24	CO ₂ 0.40 X 0.79 SO ₂ 0.07 Cl 0.08	101.87	2.945

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
60	Kottenhain, near Niederhain, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 14.	Enstatite dolerite.	Same specimen as preceding number. Not fresh.
61	Buschhorn, Hesse.	C. Trenzen.	C. Trenzen, N. J., 1902, II, p. 6.	Basalt.	
62	Near Giessen, Hesse.	Hess.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 462, 1908.	Basalt.	
63	Steinbach, near Giessen, Hesse.	A. Streng.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 458, 1908.	Basalt.	
64	Near Giessen, Hesse.	G. Butzbach.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 462, 1908.	Basalt.	
65	Burckardsfelsen, near Giessen, Hesse.	A. Streng.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 454, 1908.	Basalt.	
66	Schliffenberg, near Giessen, Hesse.	Hess.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 458, 1908.	Basalt.	
67	Altenbuseck-Treis, near Giessen, Hesse.	W. Schottler.	W. Schottler, Nb. Ver. Erdk., IV, p. 26, 1899.	Basalt.	Not in W. T.
68	Hundsköppel, near Giessen, Hesse.	H. Heyl.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 454, 1908.	Basalt.	
69	Lollarerkopf, near Giessen, Hesse.	W. Schottl.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 454, 1908.	Basalt.	
70	Frauenberg, Breitfirst, Hesse.	R. Wedel.	R. Wedel, Jb. Pr. G. L.-A., XI, p. 21, 1892.	Basalt.	In W. T., p. 451.
71	Londorf, Vogelsberg, Hesse.	A. Streng.	A. Streng, N. J., 1888, II, p. 211.	Dolerite.	In W. T., p. 451.
72	Michelnau, Vogelsberg, Hesse.	J. M. Ledroit.	J. M. Ledroit, Ber. Oberh. Ges., XXIV, p. 151, 1886.	Basalt.	In W. T., p. 451.
73	Dolmesberg, Hesse.	F. W. Schmidt.	C. Chelius, Erl. G. Kt. Hes., Bl. Messel, p. 33, 1886.	Basalt.	In W. T., p. 451.
74	Bobenhausen, Vogelsberg, Hesse.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 493, 1887.	Tachylite.	In W. T., p. 451.
75	Kleinostheim, Hesse.	Not stated.	G. Klemm, Erl. G. Kt. Hes., Bl. Schafheim, p. 33, 1894.	Basalt.	In W. T., p. 451.
76	Otzberg, Hesse.	Not stated.	G. Klemm, Erl. G. Kt. Hes., Bl. Schafheim, p. 33, 1894.	Basalt.	In W. T., p. 451.
77	Bühl, near Cassel, Hesse-Nassau.	O. Fromm.	P. Fromm, Z. D. G. G., XLIII, p. 72, 1891.	Basalt.	In W. T., p. 449.
78	Klein Staufenberg, near Cassel, Hesse-Nassau.	O. Fromm.	O. Fromm, Z. D. G. G., XLIII, p. 72, 1891.	Basalt.	In W. T., p. 449.

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp.gr.
79 D2. V	51.84	11.27	5.47	4.98	6.21	8.57	4.34	2.05	1.71		0.85	0.34		CO ₂ 0.68	98.31	
80 C3. V	51.60	14.70	11.90	6.30	2.24	4.88	3.60	1.40	3.20	1.52	0.22				101.56	
81 C3. V	42.60	17.60	9.82	4.30	7.14	12.40	2.22	0.24	3.40	1.49	0.12				101.33	
82 C3. V	46.93	24.19	5.89	4.42	2.42	8.54	2.47	4.56	0.88			0.61			100.91	
83 D3. V	44.60	21.29	10.51	0.57	3.51	11.35	4.81	0.74	2.65						100.03	
84 D3. V	42.08	20.88	6.77	3.17	6.85	12.48	3.37	0.44	3.18						99.22	
85 B3. IV	42.75	17.24	8.10	5.88	6.17	11.14	4.21	2.48	1.06		2.13	trace			101.16	3.008
86 C3. V	41.68	17.98	5.40	8.42	7.40	11.84	4.28	2.07	1.09		1.21	trace			101.37	3.015
87 C3. V	46.60	20.92	6.42	3.74	2.75	7.29	5.59	4.46	1.86		0.14		0.48		100.25	2.729
88 B4. V	41.05	11.78	0.89	17.16	12.41	11.62	3.46	1.33	(2.05)			0.57			100.27	
89 C2. IV	38.78	18.43	6.16	5.21	11.05	13.00	4.36	1.29	n. d.		0.32	0.66	0.18		99.44	
90 C3. V	48.62	19.15	11.69	3.20	3.07	7.22	2.01	1.69	3.64				trace		100.29	
91 C4. V	59.52	20.18	n. d.	6.68	1.34	6.81	2.82	1.26	1.77						100.38	
92 C4. V	55.19	20.24	n. d.	8.18	4.97	8.68	1.83	0.27	0.79						100.15	
93 B3. IV	48.99	16.33	4.27	6.19	3.96	8.90	5.21	1.40	3.08		0.98				99.31	
94 D2. V	46.78	14.66	7.25	5.22	6.81	9.61	3.08	0.45	1.78		1.78	0.45			97.87	
95 D2. V	46.18	14.26	6.93	5.72	7.23	8.24	4.75	1.32	2.14		2.27	0.51			98.95	
96 C3. V	43.12	20.12	3.49	14.45	3.17	8.32	5.43	1.02	0.40		0.40	trace	trace		100.01	
97 C3. V	40.53	21.16	5.14	9.33	5.25	9.57	5.65	1.19	2.07		0.48	trace	trace		100.37	
98 B4. V	51.34	14.92	8.84	n. d.	3.56	9.37	3.13	0.64	8.08						99.88	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
79	Near Alzenau, Spessart, Bavaria.	F. Knapp.	H. Bücking, Abh. Pr. G. L.-A., XII, p. 220, 1892.	Basalt.	Not in W. T.
80	Kosel, Böhmer-Leipa, Bohemia.	E. Donath.	B. Förstner, Jb. G. R.-A. Wien, LV, p. 588, 1905.	Schliere in basalt.	Cf. next number.
81	Kosel, Böhmer-Leipa, Bohemia.	E. Donath.	B. Förstner, Jb. G. R.-A. Wien, LV, p. 589, 1905.	Basalt.	
82	Rongstock, Bohemia.	Student of Jannasch.	H. O. Lang, T. M. P. M., XV, p. 191, 1890.	Dolerite.	Cf. No. 22, II. 6. 2. 4. In W. T., p. 451.
83	Burberg, Duppauergebirge, Bohemia.	J. M. Clements.	J. M. Clements, Jb. G. R.-A. Wien, XL, p. 345, 1890.	Basalt.	In W. T., p. 451.
84	Burberg, Duppauergebirge, Bohemia.	J. M. Clements.	J. M. Clements, Jb. G. R.-A. Wien, XL, p. 345, 1890.	Basalt.	In W. T., p. 303.
85	Scharfenstein, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XVII, p. 48, 1897.	Basalt.	In W. T., p. 345.
86	Paudlers Berg, near Güntersdorf, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XV, p. 247, 1896.	Basalt.	In W. T., p. 351.
87	Bezdedic, Mittelgebirge, Bohemia.	E. Kohn.	B. Zahalka, Sb. Böhm. Ges. W., p. 57, 1905.	Trachybasalt.	
88	Lobosch, Mittelgebirge, Bohemia.	J. Hanamann.	J. Hanamann, Arch. Landdf. Böhm., VII (3), p. 57, 1890.	Basalt.	3 decimals. Not in W. T.
89	Radobyl, Mittelgebirge, Bohemia.	J. Hanamann.	J. Hanamann, Arch. Landdf. Böhm., VII (3), p. 59, 1890.	Basalt.	Not in W. T.
90	Weitendorf, Styria.	H. Leitmeier.	H. Leitmeier, N. J. B. B., XXVII, p. 229, 1909.	Basalt.	
91	Mount Pilis, Zemplen, Hungary.	Petrik.	J. v. Szadeczký, F. K., XXI, p. 268, 1891.	Labradorite (basalt).	In W. T., p. 433.
92	Mount Pilis, Zemplen, Hungary.	Petrik.	J. v. Szadeczký, F. K., XXI, p. 272, 1891.	Labradorite (basalt).	In W. T., p. 433.
93	Tatika, Balaton Lake, Hungary.	L. Tomasowsky (student).	J. Vitalis, F. K., XXXIV, p. 458, 1904.	Basalt.	
94	Totihegy, Balaton Lake, Hungary.	K. Emszt.	J. Vitalis, Erf. Bal. Sees., I (1), No. 2, p. 72, 1911.	Basalt.	
95	Mencshegy, Balaton Lake, Hungary.	K. Emszt.	K. Emszt, Jb. Ung. G. A. (1904), p. 338, 1908.	Basalt.	3 decimals.
96	Badacsony, Balaton Lake, Hungary.	C. Preiss.	C. Preiss. Mt. Nw. Ver. Steicrm., XLV, p. 31, 1909.	Basalt.	
97	Sümeg, Balaton Lake, Hungary.	C. Preiss.	C. Preiss, Mt. Nw. Ver. Steicrm., XLV, p. 24, 1909.	Basalt.	
98	Mount Holapi, Hungary.	K. Emszt.	K. Emszt, Jb. Ung. G. A., 1910, p. 345.	Basalt tuff.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
99 C3. V	49.70	9.40	13.70	2.80	9.47	10.25	2.85	0.18				1.65	0.34		100.34	
100 C3. V	49.65	9.38	15.72	0.85	9.40	10.25	2.78	0.18				1.50	0.32		100.03	
101 C3. V	49.42	13.01	13.34	0.96	6.30	10.84	3.48	1.05			0.04	1.25	0.21		99.90	2.34
102 C4. V	48.52	12.90	14.19	2.82	8.23	7.54	3.19	none				1.71	0.21		99.31	2.30
103 D4. V	48.52	12.80	15.39	1.52	8.33	7.84	3.29	none				1.29	0.21		99.19	2.12
104 C3. V	47.98	12.52	8.07	7.09	7.41	10.56	3.58	0.58			trace	1.95	0.33		100.07	2.75
105 C3. V	47.53	12.35	8.32	7.15	7.18	11.54	3.60	none			0.04	1.98	0.28		99.97	3.11
106 C3. V	47.51	12.53	8.08	7.05	8.40	10.05	3.85	none			0.03	2.05	0.28		99.83	3.02
107 C3. V	46.18	13.45	8.18	7.01	7.35	12.26	3.05	0.57			trace	1.56	0.31		99.92	3.01
108 C3. V	45.76	13.50	8.43	6.96	7.38	12.19	3.09	0.55				1.72	0.35		99.93	3.05
109 D4. V	43.70	23.46	3.14	5.27	3.54	13.05	4.86	n. d.	2.40					CO ₂ 2.92	102.32	
110 C4. V	49.10	13.64	17.21	n. d.	5.30	8.20	4.10	1.32	0.70		trace	1.60			101.17	2.96
111 B4. V	46.60	12.50	16.92	n. d.	6.29	9.74	3.39	1.15	1.65			1.05			99.29	
112 D4. V	44.2	20.9	12.2	n. d.	2.5	6.6	6.1	4.6	n. d.						97.1	
113 B3. IV	53.86	16.44	8.02	1.96	5.44	8.53	4.52	0.07	1.27			0.15		Cl 0.04	100.30	2.894
114 B4. V	50.34	16.72	15.12	n. d.	3.96	8.00	3.78	1.83	0.72						100.47	
115 C4. V	48.10	19.05	n. d.	11.53	7.12	9.56	2.29	1.80	0.09			0.04			99.58	2.83

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
99	Brentonico, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 406, 1895.	Basalt.	H ₂ O=7.56. Ignited before analysis. In W. T., p. 451.
100	Botte, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 406, 1895.	Basalt tuff.	H ₂ O=6.17. Ignited before analysis. In W. T., p. 451.
101	Sano, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 408, 1895.	Basalt.	H ₂ O=6.24. Ignited before analysis. In W. T., p. 453.
102	Foianeghe, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 408, 1895.	Basalt tuff.	H ₂ O=6.75. Ignited before analysis. In W. T., p. 453.
103	Nomesino, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 410, 1895.	Basalt.	H ₂ O=7.74. Ignited before analysis. In W. T., p. 453.
104	Pianeti, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 407, 1895.	Basalt.	H ₂ O=1.56. Dried before analysis. In W. T., p. 327.
105	Pradaglia, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 409, 1895.	Basalt.	H ₂ O=0.95. Dried before analysis. In W. T., p. 327.
106	Manzano, Mori, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 410, 1895.	Basalt.	H ₂ O=2.35. Dried before analysis. In W. T., p. 327.
107	Val del Parol, Mori, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 407, 1895.	Basalt.	H ₂ O=1.27. Dried before analysis. In W. T., p. 329.
108	Tierno, Mori, Rovereto, Tyrol.	P. Giacomelli.	P. Giacomelli, Riv. Soc. Alp. Trid., XIX, p. 405, 1895.	Basalt.	H ₂ O=1.34. Dried before analysis. In W. T., p. 329.
109	Fee Gletscher Alp, Pennine Alps, Switzerland.	A. A. Longsdon.	T. G. Bonney, Q. J. G. S., XLIX, p. 97, 1893.	Basalt.	Altered. Calculated from sol. and insol. In W. T., p. 453.
110	Musc'al Bo, Euganean Hills, Italy.	Not stated.	G. dal Piaz, Riv. Min. Crist., XVI, p. 65, 1896.	Basalt.	In W. T., p. 453.
111	Castelnuovo, Euganean Hills, Italy.	Not stated.	G. dal Piaz, Riv. Min. Crist., XVI, p. 69, 1896.	Basalt.	In W. T., p. 453.
112	Scajara, near Battaglia, Euganean Hills, Italy.	S. Bertolio.	S. Bertolio, B. Soc. G. Fr. (3), XXI, p. 433, 1894.	Basalt.	In W. T., p. 453.
113	Punta del Zenobito, Capraia, Tuscan Archipelago.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 143, 1893.	Anamesite.	In W. T., p. 285.
114	Cala Rossa, Capraia, Tuscan Archipelago.	A. Röhrig.	H. Emmons, Q. J. G. S., XLIX, p. 143, 1893.	Basalt.	In W. T., p. 453.
115	San Marco, near Ceccano, Ernici, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Basalt.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
116 B4. V	50.55	16.58	8.18	n. d.	6.10	11.45	3.15	3.16	0.06			0.67			99.90	
117 B3. IV	50.15	12.08	9.07	6.53	3.88	10.52	3.08	2.77	0.24			0.67	0.82	SO ₂ 0.64 Cl 0.06	100.51	
118 B3. IV	50.00	13.99	5.13	9.10	4.06	10.81	2.87	3.02	0.24			0.71	0.42	SO ₂ trace Cl trace	100.35	
119 C4. V	55.82	31.29			0.44	3.91	4.60	4.26	0.58						100.90	
120 B3. IV	53.04	13.06	8.19	2.40	5.17	10.61	3.27	2.06	2.21			0.56	0.16		100.73	
121 B4. V	51.00	15.80	10.96	n. d.	4.70	11.17	2.54	1.15	0.30	0.13		0.56		CO ₂ 0.93	99.24	
122 B3. IV	51.31	12.54	4.87	7.42	2.90	10.01	3.23	1.36	5.63		0.32	0.52	trace		100.17	2.656
123 C3. V	52.6	17.2	2.4	8.6	7.2	9.1	2.0	1.0	n. d.			trace			100.1	
124 C2. IV	47.18	15.21	4.07	7.26	6.64	8.86	7.61	1.41	0.72		1.09	0.08	0.02		100.15	2.868
125 C2. IV	47.16	15.05	0.87	11.00	6.34	9.11	7.73	1.32	0.42		1.01	0.06	0.02		100.09	2.912
126 D3. V	47.14	14.40	5.58	6.22	6.31	9.55	7.46	1.52	0.51		1.21	0.05	0.04		99.99	2.846
127 D3. V	52.93	19.03	1.67	3.94	3.20	7.00	5.01	2.07	1.25	0.64	0.67	1.13	0.28	CO ₂ 0.75	99.57	
128 D3. V	52.33	19.25	2.72	4.39	3.94	7.64	2.23	1.89	1.64	0.68	0.93	0.61	1.12		99.37	
129 D3. V	52.13	20.55	5.13	2.07	9.22	3.35	2.90	1.22	0.40		0.40	0.27	0.71		100.21	
130 D3. V	50.29	18.81	1.79	4.91	3.42	8.49	2.86	1.45	2.65	1.09	0.89	0.51	0.58	CO ₂ 3.12 Cl 0.03 S 0.19	101.08	
131 D3. V	48.72	22.56	1.08	3.74	2.68	10.00	4.65	2.05	1.88	0.84	0.50	0.50	0.77		99.87	
132 D4. V	53.36	23.17	1.92	3.34	0.89	7.34	4.62	3.08	0.83	0.55	0.59	0.60	0.48		100.77	
133 D3. V	53.15	24.47	1.40	3.60	1.22	6.83	4.97	2.59	0.57	0.20	0.60	0.56	0.32		100.48	
134 D3. V	52.14	21.89	1.74	3.50	2.81	9.16	4.15	2.34	0.93	0.32	0.51	0.77	0.40		100.66	
135 D3. V	50.96	20.31	2.49	5.59	4.23	7.32	4.60	1.98	0.20	0.13	0.61	0.53	0.94		99.89	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
116	La Sciarra, Stromboli, Æolian Islands.	F. Glaser.	A. Bergeat, N. J., 1897, II, p. 113.	Basalt.	In W. T., p. 453.
117	Eruption, August, 1891, Stromboli, Æolian Islands.	L. Ricciardi.	Ricco and Mercalli, Gior. Min., IV, p. 28, 1893.	Basalt ashes.	In W. T., p. 453.
118	Eruption of 1891, Stromboli, Æolian Islands.	L. Ricciardi.	Ricco and Mercalli, An. Uff. Met. It., XI (III), p. 202, 1892.	Basalt.	Not in W. T.
119	Eruption, 1888-89, Vulcano, Æolian Islands.	O. Silvestri.	G. Mercalli, Gior. Min., III, p. 108, 1892.	Dolerite.	In W. T., p. 453.
120	Punta Luccia, Vulcano, Æolian Islands.	L. Ricciardi.	G. Mercalli, Gior. Min., III, p. 102, 1892.	Basalt.	In W. T., p. 325.
121	Notaro, Filicudi, Æolian Islands.	F. Glaser.	A. Bergeat, Abh. Bay. Ak. W., XX, p. 207, 1899.	Basalt.	In W. T., p. 453.
122	Eruption of November, 1884, Mount Etna, Sicily.	L. Ricciardi.	L. Ricciardi, At. Ac. Gioen., XVIII, p. 4, 1884.	Basalt ash.	In W. T., p. 453.
123	Monte Altore, near Vizzini, Val di Noto, Sicily.	A. Rosati.	A. Rosati, Rend. Ac. Linc. (5), X, p. 23, 1901.	Basalt.	
124	Serravalle, near Palagonia, Val di Noto, Sicily.	G. Ponte.	G. Ponte, At. Ac. Gioen. (5), III, No. 10, p. 5, 1910.	Basalt.	Alkalies? Norm and mode.
125	Serravalle, near Palagonia, Val di Noto, Sicily.	G. Ponte.	G. Ponte, At. Ac. Gioen. (5), III, No. 10, p. 5, 1910.	Basalt glass.	Crust of preceding. Alkalies?
126	Monte Lauro, Val di Noto, Sicily.	S. Mariscalco.	S. Mariscalco, At. Ac. Gioen. (5), VII, No. 9, p. 6, 1914.	Basalt.	Alkalies? Norm and mode.
127	Ferru Ezzu, near Sassari, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc., XVII (1), p. 135, 1908.	Basalt.	
128	Monte San Matteo, Ploaghe, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc., XVII (1), p. 130, 1908.	Basalt.	Cf. No. 93, II. 5.2.4.
129	Adde de S'Ulmu, near Ploaghe, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc., XVII, (2), p. 600, 1908.	Basalt.	
130	Coloru, near Ploaghe, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc. (5), XVI (2), p. 354, 1907.	Basalt.	
131	Fenosu, near Ploaghe, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc. (5), XVII (2), p. 598, 1908.	Basalt.	
132	Monte Pelao, near Tiesi, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc. (5), XVIII (1), p. 401, 1909.	Basalt.	
133	Monte Santo, near Tiesi, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc. (5), XVIII (1), p. 400, 1909.	Basalt.	
134	Monte di Giave, near Tiesi, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc. (5), XVIII (1), p. 403, 1909.	Basalt.	
135	Monte Massa, near Osilo, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc. (5), XVII (1), p. 133, 1908.	Basalt.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
136 D3. V	51.61	22.87	4.14	1.17	3.02	7.98	3.79	2.74	0.29	0.12	0.64	0.92	0.80		100.09	
137 D3. V	51.80	20.09	1.83	3.42	3.31	8.32	4.24	2.15	1.83	0.71	0.61	0.92	0.52		99.75	
138 D3. V	50.07	23.98	2.18	5.27	2.70	6.70	4.81	1.86	0.27	0.13	0.71	0.90	0.74		100.32	
139 C3. V	49.87	14.80	8.25	6.88	6.77	9.36	2.81	0.68	0.45						99.87	
140 C3. V	49.35	15.71	7.44	6.96	5.71	9.80	2.96	1.31	0.49						99.73	
141 D4. V	46.40	21.84	9.53	2.04	5.37	10.33	3.27	1.69	n. d.				trace		100.47	
142 C3. V	44.64	12.74	4.21	11.17	5.82	10.12	4.31	1.41	0.51		5.86		0.20		100.99	
143 D3. V	49.24	19.06	1.77	10.33	5.00	8.75	3.89	1.19	0.63						99.86	
144 B4. V	53.42	15.08	17.13	n. d.	2.24	8.72	3.25	trace	2.34		0.85	trace			100.69	
145 C2. V	49.05	19.84	3.46	8.62	2.51	8.95	2.92	0.53	2.34		1.96	0.21		Fe 0.04	100.44	
146 D3. V	47.06	29.38	5.97	0.19	3.22	8.65	3.74	0.81	0.25	0.32	0.20	0.04			100.00	
147 D3. V	48.24	20.64	4.63	5.55	5.02	7.94	5.08	1.88	0.02			0.97			99.97	2.733
148 D3. V	47.97	20.04	4.45	5.50	5.54	7.64	5.14	1.99	0.48						98.75	2.711
149 D3. V	47.79	18.52	4.65	5.47	5.31	8.34	7.66	0.69	0.12						98.53	2.695
150 D3. V	47.74	20.95	3.29	6.32	5.16	7.56	7.12	1.21	0.04			0.13			99.52	2.736
151 D3. V	47.58	20.36	3.78	5.75	5.28	8.31	6.49	1.33	0.30						98.88	2.604
152 D3. V	47.50	19.32	4.75	5.20	4.36	8.37	7.63	2.31	0.46			0.21			100.11	2.704
153 C4. V	60.50	22.10	4.58	n. d.	1.67	3.90	2.74	3.33	1.70						100.52	
154 C4. V	53.70	22.40	6.50	n. d.	3.05	7.52	2.41	2.96	2.10						100.64	
155 C4. V	51.20	22.80	5.12	n. d.	2.32	8.75	2.38	2.39	5.70						100.66	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
136	Monte Pubulema, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc. (5), XVII (2), p. 729, 1908.	Basalt.	
137	Keremule, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc. (5), XVII (2), p. 733, 1908.	Basalt.	
138	Monte Cuccuruddu, Keremule, Sardinia.	A. Serra.	A. Serra, Rend. Ac. Linc. (5), XVII (2), p. 731, 1908.	Basalt.	Cf. No. 20, III.6.2.4.
139	San Marco, Pantelleria.	H. Foerstner.	H. Foerstner, T. M. P. M., V, p. 393, 1883.	Basalt.	Cf. No. 105, III.5.3.4. Not in W. T.
140	Cuddie Monti, Pantelleria.	H. Foerstner.	H. Foerstner, T. M. P. M., V, p. 393, 1883.	Basalt.	Not in W. T.
141	Foerstner Volcano (1891), near Pantelleria.	G. H. Perry.	G. H. Perry, Nature, XLV, p. 252, 1891.	Basalt.	Cf. No. 107, III.5.3.4.
142	Foerstner Volcano (1891), near Pantelleria.	H. Foerstner.	H. Foerstner, T. M. P. M., XII, p. 512, 1891.	Basalt.	Cf. No. 107, III.5.3.4. In W. T., p. 343.
143	Ferdinandea (Graham) Island, 1831, near Pantelleria.	H. Foerstner.	H. Foerstner, T. M. P. M., V, p. 391, 1883.	Basalt.	Cf. No. 207, II.5.3.4. In W. T., p. 283.
144	Rovno, Volhynia, Russia.	Blümel.	S. Pfaffius, Ref., N. J., II, p. 78, 1888.	Basalt.	Contains metallic iron. In W. T., p. 453.
145	Rovno, Volhynia, Russia.	S. Pfaffius.	A. Lagorio, T. M. P. M., VIII, p. 480, 1887.	Basalt.	Contains metallic iron. In W. T., p. 293.
146	Bjelvi Kljutsch, Armenia.	C. Schmidt.	H. Abich, G. Armen., II, p. 154, 1888.	Dolerite.	SiO ₂ includes loss. 3 decimals. Not in W. T.
147	Kula, Asia Minor.	A. Röhrig.	H. S. Washington, A. J. S., XLVII, p. 122, 1894.	Kulaite.	Cf. No. 29, II.6.2.4. In W. T., p. 455.
148	Kula Devit, Asia Minor.	A. Röhrig.	H. S. Washington, In. Diss. Leip., p. 57, 1894.	Kulaite.	Not in W. T.
149	Kula Devit, Asia Minor.	A. Röhrig.	H. S. Washington, In. Diss. Leip., p. 57, 1894.	Kulaite.	Not in W. T.
150	Gediz Chai, near Kula, Asia Minor.	A. Röhrig.	H. S. Washington, A. J. S., XLVII, p. 122, 1894.	Leucite kulaite.	Cf. No. 28, II.6.2.4. In W. T., p. 455.
151	Kara Topé, near Kula, Asia Minor.	A. Röhrig.	H. S. Washington, In. Diss. Leip., p. 57, 1894.	Kulaite.	Not in W. T.
152	Kula Devit, Kula, Asia Minor.	A. Röhrig.	H. S. Washington, A. J. S., XLVII, p. 122, 1894.	Kulaite.	In W. T., p. 455.
153	Hagia Paraskevi, Mytilene, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 187, 1898.	Andesilabradorite.	Not in W. T.
154	Molyvo, Mytilene, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 187, 1898.	Basalt.	Not in W. T.
155	Stehsis, Mytilene, Aegean Sea.	L. de Launay.	L. de Launay, Ann. Mines (9), XIII, p. 187, 1898.	Andesilabradorite.	Not in W. T.

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
156 D2. V	46.20	13.40	4.00	8.56	18.92	12.24	2.82	0.48	0.18		2.18	0.53	0.28		101.79	
157 C2. IV	45.40	17.00	9.97	3.27	5.07	10.72	3.28	1.09	0.16		2.90	1.27	0.40		100.53	
158 C4. V	48.25	19.23	10.87	n. d.	5.17	7.91	3.86	1.67	3.16						100.12	
159 C2. IV	52.40	14.12	6.52	4.47	6.77	9.43	3.50	0.31	0.22	0.21	2.71	0.14	0.41	CO ₂ trace	101.21	
160 D4. V	50.60	14.80	6.00	n. d.	4.00	6.60	1.60		16.00						99.60	
161 C2. IV	43.76	10.90	3.49	9.82	12.76	13.80	2.21	0.31	1.00		2.32	0.51	0.32		101.20	
162 D3. V	48.09	19.05	3.44	5.59	3.50	9.42	5.06	2.88	0.67		4.38				102.08	
163 B3. IV	46.67	12.64	6.13	10.07	5.64	11.48	1.64	2.31	2.64			0.74	0.19	Cr ₂ O ₃ 0.34	100.49	2.703
164 B3. IV	46.30	13.44	4.11	12.61	4.42	11.88	2.13	1.94	3.02			0.59	0.22	Cr ₂ O ₃ 0.26	100.92	2.401
165 B3. IV	45.57	13.07	6.72	12.43	2.80	6.79	2.04	3.36	6.06			0.52	0.21	Cr ₂ O ₃ 0.28	99.85	2.331
166 C3. V	50.1	19.6	1.8	9.5	4.9	7.1	3.1	1.2	1.5		1.3				100.1	2.87
167 D3. V	49.8	17.9	2.9	11.5	4.6	7.1	3.2	0.8	0.0		3.8				101.6	2.97
168 D3. V	49.3	16.0	3.3	11.1	5.2	8.6	2.9	0.6	0.5		3.9				101.4	2.92
169 D4. V	48.7	15.7	1.5	12.5	6.0	10.1	3.3	0.5	1.0		1.7				101.0	3.01
170 D3. V	47.3	17.8	4.2	11.5	4.5	7.1	2.8	1.1	1.6		3.4				101.3	2.93
171 D3. V	46.6	18.8	0.4	9.1	12.2	10.6	2.1	0.2	0.1		1.4				101.5	3.00
172 D3. V	46.3	20.1	2.7	10.0	7.8	9.3	2.9	0.7	0.7		1.8				101.6	2.94
173 C3. V	46.2	19.0	1.3	13.2	4.7	7.7	2.7	0.7	1.5		4.0				101.0	3.01
174 D4. V	49.47	18.70	15.05	n. d.	5.34	8.90	2.87	0.79	0.81						101.93	
175 D4. V	50.09	12.60	22.31	n. d.	3.48	9.13	(2.29)		0.20						100.00	

BASALT—Continued.

No.	Locality.	Reference.	Analyst.	Rock name.	Remarks.
156	Punta Delgada, San Miguel, Azores.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 289, 1896.	Anamesite.	In W. T., p. 453.
157	Punta Delgada, San Miguel, Azores.	C. v. John.	C. v. John, Jb. G. R.-A. Wien., XLVI, p. 290, 1896.	Basalt.	Cf. No. 129, III.5.4.4-5. In W. T., p. 283.
158	Cap Marsa, Menerville, Algeria.	L. Duparc.	Duparc, Pearce, and Ritter, Mem. Soc. Ph. Gen., XXXIII, No. 2, p. 94, 1900.	Basalt.	In W. T., p. 453.
159	Between Ghadames and Tripoli, Tripolitania.	E. Manasse.	E. Manasse, B. Soc. G. It., XXIV, p. 141, 1905.	Olivine basalt.	
160	Dakar, Cap Verde, Senegal.	L. Rioult.	L. Guilbert, B. Soc. G. Fr. (4), V, p. 773, 1905.	Pozzolana.	
161	Green Mountain, Sao Vicente, Cap Verde Islands.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 284, 1896.	Dolerite.	In W. T., p. 359.
162	Inaccessible Island, Tristan d'Acunha.	C. Klement.	A. Renard, Pet. Oc. Isllds., p. 88, 1889.	Tachylyte.	In W. T., p. 455.
163	Assab, near Massaua, Eritrea.	L. Ricciardi.	L. Ricciardi, B. Soc. G. It., V, p. 58, 1886.	Basalt.	In W. T., p. 317.
164	Assab, near Massaua, Eritrea.	L. Ricciardi.	L. Ricciardi, B. Soc. G. It., V, p. 58, 1896.	Basalt.	In W. T., p. 325.
165	Assab, near Massaua, Eritrea.	L. Ricciardi.	L. Ricciardi, B. Soc. G. It., V, p. 59, 1896.	Basalt.	In W. T., p. 317.
166	Arto, Djebel Guemel, French Somali.	H. Arsандаux.	H. Arsандаux, C. R., CXXXVII, p. 1310, 1903.	Basalt.	
167	Karakourkoura, French Somali.	H. Arsандаux.	H. Arsандаux, C. R., CXXXVII, p. 1310, 1903.	Labradorite (basalt).	
168	Guildessa, French Somali.	H. Arsандаux.	H. Arsандаux, C. R., CXXXVII, p. 1310, 1903.	Labradorite (basalt).	
169	Chissi, near Djibouti, French Somali.	H. Arsандаux.	H. Arsандаux, C. R., CXXXVII, p. 1310, 1903.	Labradorite (basalt).	
170	Baldji, French Somali.	H. Arsандаux.	H. Arsандаux, C. R., CXXXVII, p. 1310, 1903.	Basalt.	
171	Yabelé, near Djibouti, French Somali.	H. Arsандаux.	H. Arsандаux, C. R., CXXXVII, p. 1310, 1903.	Basalt.	
172	Ouaramalka, French Somali.	H. Arsандаux.	H. Arsандаux, C. R., CXXXVII, p. 1310, 1903.	Basalt.	
173	Ima, French Somali.	H. Arsандаux.	H. Arsандаux, C. R., CXXXVII, p. 1310, 1903.	Labradorite (basalt).	
174	French Somali.	Pisani.	Gennes and Bonard, C. R., CXXI, p. 197, 1900.	Basalt.	Not in W. T.
175	Kichuchu, Ruvenzori, Uganda.	A. Roccati.	A. Roccati in Duca Abruz., Ruvenzori, p. 229, 1909.	Basalt.	Alkalies by difference.

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
176 D2. V	49.02	14.75	3.28	8.61	8.52	9.61	3.06	1.56	0.22		2.25	0.60	0.20		101.68	
177 D2. V	46.67	14.91	6.57	7.81	7.25	9.24	3.07	1.45	1.50		3.19	0.47	0.07		102.20	
178 C2. IV	45.32	14.35	4.51	8.19	9.25	11.31	3.32	2.06	0.51		1.54	0.91	0.05		101.32	
179 B4. V	47.00	16.60	11.00	n. d.	9.80	11.38	3.00	0.46	1.89						101.13	
180 B4. V	50.53	18.36	11.76	n. d.	4.40	9.33	2.07	3.23	1.35						101.03	
181 C3. V	50.4	22.2	9.9	3.6	1.5	8.4	0.9	1.8	0.9		0.9				100.5	
182 C3. V	53.96	24.38	4.65	2.87	2.63	5.16	1.92	1.41	2.63						99.61	
183 C3. V	44.10	25.59	8.28	2.88	4.85	8.96	2.12	2.80	1.16						100.64	
184 C3. V	43.10	25.62	7.19	1.68	4.00	9.98	2.90	5.90	n. d.						100.37	
185 C3. V	55.58	23.22	4.13	2.09	3.05	7.31	2.07	1.12	1.50				trace		100.07	2.82
186 C3. V	48.56	20.09	2.87	4.03	8.33	9.92	3.90	0.83	1.20						99.73	2.94
187 C3. V	47.52	21.45	6.43	2.13	4.84	7.76	5.04	1.58	3.56				0.38		100.69	2.82
188 C3. V	44.26	20.87	7.23	2.09	5.39	12.55	1.90	0.39	5.00				trace		99.68	2.82
189 B3. IV	57.06	20.00	3.03	3.01	3.27	7.18	2.95	3.06	0.77	0.13					100.46	
190 B4. V	53.81	19.69	8.16	n. d.	3.13	7.73	3.64	2.19	2.13	0.24					100.72	
191 C3. V	47.65	19.32	3.93	4.92	3.90	6.15	3.58	4.61	5.15		0.75	1.23			101.19	
192 D3. V	49.81	14.39	7.84	2.56	1.68	14.70	4.52	1.98	1.27						98.75	2.771
193 D3. V	48.30	25.35	1.25	5.43	2.70	11.50	2.44	0.73	1.32		trace		0.23		99.25	2.580
194 D3. V	47.60	32.02	1.55	3.30	2.70	10.00	2.05	1.09	1.13				0.44		101.88	2.819
195 C2. IV	51.86	18.56	0.38	10.69	3.72	5.77	3.30	2.10	0.56	0.24	0.70	1.44	0.18		99.50	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
176	Tritriw, Antsirabé, Madagascar.	Not stated.	Duparc, Wunder, and Sabot, Mem. Soc. Ph. Gen., XXXVI (3), p. 298, 1910.	Basalt.	
177	Vohitra, Antsirabé, Madagascar.	Not stated.	Duparc, Wunder, and Sabot, Mem. Soc. Ph. Gen., XXXVI (3), p. 298, 1910.	Basalt.	
178	Vinonkarena, Antsirabé, Madagascar.	Not stated.	Duparc, Wunder, and Sabot, Mem. Soc. Ph. Gen., XXXVI (3), p. 298, 1910.	Basalt.	
179	Kimberley, Griqualand.	Not stated.	L. de Launay, C. R., CXXXV, p. 336, 1897.	Basalt.	In W. T., p. 453.
180	Buhemin, Elburz Mountains, Persia.	E. Drasche.	E. Drasche, Vh. G. R.-A. Wien., XVIII, p. 196, 1884.	Basalt.	In W. T., p. 455.
181	Poonah, Western Ghats, Bombay, India.	F. S. Warth.	H. Warth, G. Mag. (V), II, p. 21, 1905.	Dolerite.	
182	Sasa River, Witim Plateau, Lake Baikal, Siberia.	Not stated.	B. Polanow, Ref., N. J., 1902, I, p. 231.	Basalt.	
183	Dshilinda River, Witim Plateau, Lake Baikal, Siberia.	Not stated.	B. Polanow, Ref., N. J., 1902, I, p. 231.	Olivine basalt.	
184	Tunkinsk, Lake Baikal, Siberia.	Not stated.	B. Polanow, Ref., N. J., 1902, I, p. 231.	Basalt.	
185	Ulja River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 57.	Basalt.	
186	Nikolaievsk, Amur River, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 57.	Olivine basalt.	
187	Sebach, Amur River, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 57.	Olivine basalt.	
188	Ulja River, Okhotsk, Siberia.	Not stated.	K. E. Bogdanovitch, Fund. Marek., p. 57.	Basalt.	
189	Batuaan Creek, Benguet, Luzon, Philippine Islands.	P. J. Fox.	A. J. Eveland, Phil. J. Sci. (A), II, p. 226, 1907.	Basalt.	
190	Malaqui, Taal Volcano, Philippine Islands.	A. J. Cox.	A. J. Cox, Phil. J. Sci. (A), III, p. 404, 1908.	Dolerite.	
191	Kau, near Maros Peak, Celebes.	Hinden.	C. Schmidt in Sarasin, Ins. Celebes, IV, p. 13, 1901.	Basalt.	
192	Boekit Doea Volcano, Sumatra.	A. Clausnitzer.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Basalt.	Not in W. T.
193	Atar Volcano, Sumatra.	Reuter.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Basalt.	Not in W. T.
194	Koeliet Manies Volcano, Sumatra.	Reuter.	R. D. M. Verbeek, Sum. Westk., p. 516, 1883.	Basalt.	Not in W. T.
195	Ipswich, Purga Parish, Queensland.	G. R. Patten.	A. R. Agric. Chem. Qld., 1912.	Basalt.	H. C. Richards, peis. com.

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
196 D3. V	43.50	14.60	5.40	8.28	6.16	8.70	7.34	2.95	2.50		0.10	trace		Cl Cr ₂ O ₃ 0.37 trace	99.90	2.94
197 C3. V	47.21	16.06	11.87	4.43	0.12	7.34	7.51	2.40	2.55						99.49	2.81
198 C2. IV	50.05	21.66	3.23	4.93	3.51	10.14	3.08	1.59	0.75		0.95		0.06		99.95	
199 C3. V	45.80	17.91	6.14	8.69	3.92	8.10	4.71	1.77	2.10		0.35			Cl 0.11	99.60	
200 B3. IV	44.00	14.07	5.16	10.87	11.18	10.28	1.74	1.98	1.40		0.47			Cl 0.11	101.26	
201 D3. V	45.28	19.01	8.52	5.01	5.14	7.55	2.66	2.51	2.99						98.67	
202 B3. IV	44.91	17.59	8.07	9.08	6.41	7.88	3.37	1.58	1.54		(0.87)				101.30 (101.32)	
203 B3. IV	45.02	17.78	6.61	8.72	6.29	8.76	3.82	1.16	1.57		(0.87)				100.60	2.957
204 B3. IV	42.19	18.00	7.73	8.67	7.06	9.27	3.15	1.05	1.35		0.87				99.34	
205 C3. V	46.67	22.36	1.44	7.70	2.90	10.27	1.87	1.50	3.73		1.19		0.32	CO ₂ 0.05	100.00	
206 C4. V	47.44	16.51	15.33	3.19	8.80	6.02	1.60	0.30				0.61	0.37	CO ₂ 0.17 SO ₂ 0.06 CuO 0.08	100.48	
207 C4. V	40.11	12.40	14.64	trace	11.65	12.24	2.72	0.96				0.57	0.25	CO ₂ 4.15 SO ₂ 0.17 CuO 0.11	99.97	
208 C4. V	37.82	13.16	14.11	0.14	11.75	13.39	1.66	1.49				0.82	0.24	CO ₂ 5.56 SO ₂ 0.15 FeS ₂ 0.05 CuO 0.07	100.41	
209 D4. V	34.81	33.18	23.03	2.34	0.39	trace	trace	trace			4.89	0.39	0.28	SO ₂ 0.31 CuO 0.37	99.99	
210 D4. V	4.54	41.35	40.87	2.52	0.37	trace	trace	trace			8.99	0.63	0.08	SO ₂ 0.55 CuO 0.26	100.16	
211 D4. V	50.00	22.80	14.15	4.05	1.93	3.17	1.99		0.33		0.42	trace	0.97		99.81	2.77
212 D4. V	48.65	16.47	8.90	7.70	3.20	7.60	5.00		0.28		0.36	trace	0.99		99.15	2.85
213 D4. V	48.60	25.45	17.55	1.20	0.98	2.20	1.30		1.87		trace	trace	trace		99.23	2.80

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
196	Bondi, New South Wales.	Not stated.	J. M. Curran, Pr. R. Soc. N. S. W., XXVIII, p. 225, 1894.	Basalt.	Cf. No. 54, III.6.3.4. In W. T., p. 353.
197	One Tree Point, Sandy Bay, Tasmania.	O. E. White.	White and Macleod, Pr. R. Soc. Tas., p. 78, 1900.	Fayalite basalt.	Not in W. T.
198	Mangorei Creek, New Plymouth, Taranaki, New Zealand.	J. S. Maclaurin.	E. D. Clarke, N. Z. G. S. B. 14, p. 23, 1912.	Basalt?	
199	Signal Hill, Dunedin, New Zealand.	C. A. Cotton.	C. A. Cotton, Tr. N. Z. Inst., XLI, p. 122, 1909.	Basalt.	"MgO low" in ref.
200	Signal Hill, Dunedin, New Zealand.	C. A. Cotton.	C. A. Cotton, Tr. N. Z. Inst., XLI, p. 123, 1909.	Basalt.	
201	Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 412, 1906.	Basalt.	
202	Clarendon, Otago, New Zealand.	A. R. Andrew.	A. R. Andrew, Tr. N. Z. Inst., XXXVIII, p. 461, 1906.	Basalt.	
203	Clarendon, Otago, New Zealand.	A. R. Andrew.	A. R. Andrew, Tr. N. Z. Inst., XXXVIII, p. 461, 1906.	Basalt.	
204	Clarendon, Otago, New Zealand.	A. R. Andrew.	A. R. Andrew, Tr. N. Z. Inst., XXXVIII, p. 461, 1906.	Basalt.	
205	Waiwate North, Whangaroa, New Zealand.	J. S. Maclaurin.	Bell and Clarke, N. Z. G. S. B. 8, p. 71, 1909.	Dolerite.	
206	Salt Lake, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Basalt tuff.	Ignited before analysis. H ₂ O+=5.04. H ₂ O-=9.08. In W. T., p. 455.
207	Diamond Head, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Basalt tuff.	Ignited before analysis. H ₂ O+=6.48. H ₂ O-=5.46. In W. T., p. 455.
208	Punch Bowl, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Basalt tuff.	Ignited before analysis. H ₂ O+=8.24. H ₂ O-=9.98. In W. T., p. 455.
209	Honolulu, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Basalt.	Ignited before analysis. H ₂ O+=11.63. H ₂ O-=6.43. In W. T., p. 455.
210	Kaneohe, Oahu, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Altered basalt.	Ignited before analysis. H ₂ O+=20.48. H ₂ O-=3.55. In W. T., p. 457.
211	Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 171, 1888.	Basaltoid.	In W. T., p. 455.
212	Kilauea, Hawaii, Hawaiian Island.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 193, 1888.	Basalt.	Not in W. T.
213	Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 169, 1888.	Basaltoid.	In W. T., p. 455.

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
214 B3. IV	48.04	14.62	9.18	11.68	2.17	7.66	4.00	1.28	0.00		trace	0.45	1.91		100.99	2.78
215 B3. IV	47.61	16.09	7.00	10.60	3.10	8.15	2.98	1.15	0.70		0.39	trace	1.72		99.49	2.93
216 C3. V	45.30	14.90	10.87	8.20	3.78	6.58	5.23	1.77	1.20		trace	0.25	0.91		98.99	2.79
217 B3. IV	51.77	15.66	8.46	6.54	4.95	9.56	2.17	0.96	n. d.				0.82		100.89	
218 B3. IV	50.76	14.75	2.89	9.85	6.54	11.05	2.70	0.88	n. d.			0.26	0.41		100.09	
219 C4. V	24.62	23.89	37.85	2.08	0.99	trace	1.41	trace			8.12	0.24	0.25	SO ₃ 0.40 CuO 0.27	100.12	
220 D4. V	67.0	9.7	8.6	n. d.	6.7	4.3	3.2	0.3	n. d.						99.8	
221 D4. V	55.49	16.00	5.65	6.83	n. d.	7.96	4.40	0.69						SO ₃ 0.60	97.62	
222 D4. V	49.01	16.13	7.29	10.10	n. d.	10.66	4.20	0.65						SO ₃ 0.24	98.28	
223 C2. IV	50.56	10.30	4.95	7.59	9.27	9.35	2.81	1.24	1.70		0.80		0.14		98.71	
224 B3. IV	46.84	17.78	1.64	10.79	9.24	11.87	2.02	0.28	n. d.				0.34		100.80	
225 D3. V	46.76	17.71	1.73	10.92	10.37	11.56	1.83	0.17	n. d.				0.44		101.49	
226 C4. V	44.73	16.28	14.57	n. d.	2.23	1.88	4.50	4.02	9.56				2.89		100.64	
227 C3. V	53.31	9.01	17.34	2.00	0.73	9.06	3.42	3.35	0.14				1.44		99.80	2.686
228 C2. IV	46.78	21.22	4.63	6.17	4.30	12.07	1.40	0.64	0.94	0.50	1.20	0.31	trace	CO ₂ trace Cl trace S none Cr ₂ O ₃ 0.05 BaO none SrO none	100.21	2.90
229 D4. V	54.1	18.2	11.2	n. d.	0.5	3.8	(4.9)		7.2						100.0	2.5
230 C3. V	53.40	15.94	9.14	3.59	3.37	8.57	2.18	1.19	1.51		2.60				101.49 (100.39)	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
214	Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 175, 1888.	Basalt.	MnO high. In W. T., p. 325.
215	Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 183, 1888.	Basaltoid.	MnO high. In W. T., p. 325.
216	Kilauea, Hawaii, Hawaiian Islands.	O. Silvestri.	O. Silvestri, B. C. G. It., XIX, p. 180, 1888.	Basaltoid.	In W. T., p. 455.
217	Kilauea, Hawaii, Hawaiian Islands.	A. H. Phillips.	A. H. Phillips, A. J. S., XLVII, p. 473, 1894.	Basalt.	Stalagmite. In W. T., p. 455.
218	Kilauea, Hawaii, Hawaiian Islands.	A. H. Phillips.	A. H. Phillips, A. J. S., XLVII, p. 473, 1894.	Basalt.	Pelé's hair. In W. T., p. 337.
219	Hilo, Hawaii, Hawaiian Islands.	A. B. Lyons.	A. B. Lyons, A. J. S., II, p. 427, 1896.	Altered basalt.	Ignited before analysis. H ₂ O+=12.70. H ₂ O-=8.49. In W. T., p. 457.
220	Kilauea, Hawaii, Hawaiian Islands.	W. Maxwell.	W. Maxwell, Lavas and Soils of Hawaii, p. 19, 1898.	Basalt.	Decomposed. Not in W. T.
221	Kilauea, Hawaii, Hawaiian Islands.	W. Maxwell.	W. Maxwell, Lavas and Soils of Hawaii, p. 13, 1898.	Basalt.	"Acted on by SO ₂ ." Cf. next number. Not in W. T.
222	Kilauea, Hawaii, Hawaiian Islands.	W. Maxwell.	W. Maxwell, Lavas and Soils of Hawaii, p. 13, 1898.	Basalt scoria.	Not in W. T.
223	Lat. 12° 8' S., Long. 145° 10' E., South Pacific Ocean.	A. F. Renard.	Murray and Renard, Chall. Rep., Deep Sea Dep., p. 297, 1891.	Basalt pumice.	Not in W. T. Dredged block.
224	Lat. 42° 43' S., Long. 82° 11' W., South Pacific Ocean.	A. F. Renard.	Murray and Renard, Chall. Rep., Deep Sea Dep., p. 307, 1891.	Volcanic glass.	Not in W. T. Dredged block.
225	Lat. 13° 28' S., Long. 149° 30' W., South Pacific Ocean.	A. F. Renard.	Murray and Renard, Chall. Rep., Deep Sea Dep., p. 307, 1891.	Basalt glass.	In W. T., p. 457. Dredged block.
226	Lat. 13° 28' S., Long. 149° 30' W., South Pacific Ocean.	A. F. Renard.	Murray and Renard, Chall. Rep., Deep Sea Dep., p. 307, 1891.	Palagonite.	In W. T., p. 457. Dredged block.
227	Port Resolution, Tanna Island, New Hebrides.	A. Liversidge.	A. Liversidge, J. R. Soc. N. S. W., XX, p. 237, 1887.	Lava (basalt?).	Al ₂ O ₃ and iron oxides? In W. T., p. 271.
228	Mau Island, New Hebrides.	D. Mawson.	D. Mawson, Pr. Linn. Soc. N. S. W., XXX, p. 470, 1905.	Basalt.	Cf. No. 194, III.5.4.4.
229	Campbell Island.	R. Speight.	R. Speight, Tr. N. Z. Inst., XXXVII, p. 554, 1905.	Tachylyte.	
230	Mount Honey, Campbell Island.	P. Marshall.	P. Marshall, Subant. Islds., II, p. 696, 1900.	Basalt.	

BASALT—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
231 C2. IV	47.14	19.35	5.61	10.82	3.98	5.42	2.38	1.60	0.96	0.84	0.68	0.14	0.18	CO ₂ 0.26	99.36	2.96
232 D3. V	48.3	15.4	1.7	10.3	9.6	9.3	3.7	1.4	n. d.		1.9				101.6	
233 A4. IV	45.13	18.13	2.94	n. d.	7.33	11.23	2.14	0.98	2.18						100.06	

NEPHELITE SYENITE.

1 B4. V	60.92	21.34	n. d.	3.44	0.16	1.34	6.02	6.33	0.60						100.15	
2 C2. IV	55.11	16.76	2.18	5.72	3.20	6.66	3.98	3.25	1.66		0.78	0.49	0.28		100.07	
3 C2. IV	48.60	13.60	2.30	4.97	8.79	10.00	1.42	5.62	0.61		0.79	0.19		CO ₂ 1.23 SO ₃ 0.54 Cl trace F none	98.66	
4 D4. V	50.36	19.34	6.94	n. d.	n. d.	3.43	7.64	7.17	3.51				0.41		98.80	
5 C3. V	55.83	16.58	1.69	3.62	1.49	4.34	8.78	7.35	0.42						100.10	
6 C3. V	60.42	19.23	0.63	3.19	0.67	1.73	6.99	6.88	1.74				trace		101.48	
7 C3. V	58.61	21.12	2.62	1.14	0.79	0.62	7.85	5.93	1.01		1.10	trace	trace		100.79	
8 D4. V	60.29	21.39	3.07	n. d.	trace	0.46	12.30	trace	0.67						98.18	
9 C3. V	59.20	20.60	2.31	2.07	0.87	0.93	7.01	6.75	1.50		0.07			Cl none	101.31	
10 C2. IV	42.60	17.20	4.55	7.60	4.28	9.22	3.43	2.91	5.25		3.50	1.31			101.55	
11 D4. V	52.24	26.95	n. d.	2.14	0.29	4.00	6.04	6.73	2.77						101.16	
12 D4. V	37.44	33.97	n. d.	1.17	n. d.	4.53	12.94	4.78	n. d.		0.49		trace	(CO ₂ 3.17)	98.62	
13 D4. V	55.68	23.81	4.84	n. d.	0.65	1.69	9.23	5.16	0.39					Graphite 0.58	101.98	2.593
14 C4. V	55.41	19.84	9.50	n. d.	n. d.	3.86	5.97	5.29	n. d.						99.87	
15 D3. V	52.03	22.34	1.13	1.63	0.67	2.09	8.44	5.16	1.79		0.99		0.41	CO ₂ 1.32	98.00	

BASALT—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
231	Adams Island, Auckland Islands.	A. M. Wright.	Speight and Finlayson, Subant. Islds., II, p. 733, 1909.	Basalt.	
232	Wiencke Island, Graham Land, Antarctica.	Pisani.	E. Gourdon, C. R., CXLIII, p. 179, 1906.	Basalt.	
233	Cape Adare, South Victoria Land, Antarctica.	J. A. Schofield.	David, Smeeth, and Schofield, J. R. Soc. N. S. W., XXIX, p. 477, 1895.	Basalt.	In W. T., p. 457.

NEPHELITE SYENITE.

1	Port Coldwell, Ontario.	E. S. Moore.	H. L. Kerr, Rep. Bur. Min. Ont., XIX (1), p. 209, 1910.	Nephelite syenite.	
2	Port Coldwell, Ontario.	F. A. Genth.	H. L. Kerr, Rep. Bur. Min. Ont., XIX (1), p. 209, 1910.	Nephelite syenite.	Quartz in norm.
3	Crown Hill, near Ottawa, Ontario.	M. Dittrich.	A. Osann, Can. G. S. A. R., XII, p. 45, 1902.	Shonkinite.	"Good in spite of low sum."
4	Beemerville, Sussex County, New Jersey.	F. W. Love.	J. F. Kemp, Tr. N. Y. Ac. Sc., XI, p. 65, 1892.	Nephelite syenite.	Complete in separate. In W. T., p. 401.
5	Constancia, Jacupiranga, Sao Paulo, Brazil.	St. Dizier and Dafert.	O. A. Derby, pers. com.	Nephelite syenite.	Published?
6	Moita, Foia, Portugal.	M. Dittrich.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 225, 1896.	Nephelite syenite.	In W. T., p. 207.
7	Hæum, Longendal, Norway.	O. N. Heiden- reich.	W. C. Brögger, Eg. Kg., III, p. 176, 1899.	Foyaite.	Na ₂ O low. Cf. ref., p. 181. In W. T., p. 211.
8	Kaltschik River, Marinpol, Russia.	Nikolajew.	P. Jeremejeff, Ref. N. J., 1900, I, p. 395.	Nephelite syenite.	In W. T., p. 213.
9	Nosy Komba, Madagascar.	A. Pisani.	A. Lacroix, Mat. Min. Mad., I, p. 53, 1902.	Microditroite.	
10	Andevenanaomby, Bezavona, Madagascar.	Pisani.	A. Lacroix, Mat. Min. Mad., II, p. 210, 1903.	Covite.	Spots in syenite. Cf. No. 48, I.5.2.4.
11	Zerafshan, Turkestan.	Not stated.	J. Preobrajensky, An. Inst. Pet. Grt., XV, p. 308, 1911.	Nephelite syenite.	
12	Zerafshan, Turkestan.	Not stated.	J. Preobrajensky, An. Inst. Pet. Grt., XV, p. 328, 1911.	Nephelite syenite.	
13	Sivamalai, Coimbatore, Madras, India.	T. L. Walker.	T. H. Holland, Mem. G. S. Ind., XXX (3), p. 181, 1901.	Nephelite syenite.	
14	Alibert's graphite mine, Botolgolskij-Golez, Siberia.	Alexejew.	L. Jaczewski, Ref., N. J., 1901, II, p. 75.	Nephelite syenite.	Contains graphite. In W. T., p. 401.
15	Lake Ilmen, Siberia.	Bourdakow.	A. Karpinsky, Cong. G. Int. VII, Guide V, p. 22, 1897.	Miascite.	In W. T., p. 401.

NEPHELITE SYENITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
16 D3. V	54.17	23.25	0.69	2.95	0.43	2.02	6.33	6.19	0.17		0.98		0.16	CO ₂ 1.14	98.53	
17 C2. IV	48.05	13.94	2.67	5.98	7.81	7.25	2.72	6.56	1.66		1.10		1.15		98.89	

PHONOLITE.

1 C2. IV	51.31	21.54	3.68	3.37	0.18	1.39	9.25	5.49	0.84		1.20	trace	0.41	CO ₂ 0.15 Cl 0.17	98.94	2.71
2 D4. V	45.18	23.31	6.11	n. d.	1.45	4.62	11.17	5.95	1.14						98.92	
3 B4. V	59.25	19.46	n. d.	5.08	trace	2.07	7.39	3.96	2.12	0.70					100.03	
4 B4. V	58.98	16.03	n. d.	8.27	trace	1.11	8.28	4.90	2.07	0.51					100.15	
5 B4. V	58.94	18.11	n. d.	6.31	trace	0.57	7.56	6.87	1.36	0.09					99.81	
6 C4. V	58.65	16.45	4.08	n. d.	trace	3.78	8.92	4.16	2.78	0.29					99.11	
7 B4. V	58.58	17.19	n. d.	7.69	none	0.88	9.26	4.54	1.65	0.09					99.78	
8 B4. V	58.56	18.14	n. d.	7.32	n. d.	1.56	8.49	5.28	1.01	0.12					100.48	
9 B4. V	53.38	20.40	n. d.	4.42	trace	1.56	6.23	6.26	2.70	0.50					100.45	
10 B4. V	58.09	21.29	n. d.	4.06	trace	0.81	9.35	3.79	2.26	0.20					99.85	
11 B4. V	57.45	20.38	n. d.	3.63	trace	1.84	7.41	6.19	2.76	0.36					100.02	
12 B4. V	56.34	21.06	n. d.	4.21	0.71	3.34	9.27	4.08	0.90	0.07					99.98	
13 B4. V	55.60	19.71	n. d.	5.49	0.86	1.69	8.60	4.88	2.89	0.34					100.06	
14 D4. V	55.94	19.22	3.49	n. d.	1.40	2.62	4.32	6.22	2.06	1.90				CO ₂ 1.54 S trace	98.71	2.567
15 D4. V	61.3	21.2	n. d.	3.9	0.7	0.2	10.2	2.7	n. d.						100.2	2.60
16 C3. V	59.46	24.28	1.06	1.16	0.77	3.10	7.76	2.58	(1.67)		0.26				100.43	2.579
17 C3. V	58.55	22.32	2.13	1.32	1.55	6.70	6.09	1.55	(0.73)		0.77				100.98	2.595

NEPHELITE SYENITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
16	Mount Wichniowaia, Ural Mountains, Siberia.	Bourdakow.	A. Karpinsky, Cong. G. Int. VII, Guide V, p. 22, 1897.	Miascite.	In W. T., p. 401.
17	Maros Peak, Celebes.	Hinden.	C. Schmidt in Sarasin, Ins. Celebes, IV, p. 23, 1901.	Shonkinite.	

PHONOLITE.

1	Akuliarusak, Igaliko Fjord, Greenland.	C. Detlefsen.	N. V. Ussing, G. Julh., p. 275, 1911.	Nephelite porphyry.	
2	Beemerville, Sussex County, New Jersey.	J. F. Kemp.	J. F. Kemp, Tr. N. Y. Ac. Sci., XI, p. 67, 1892.	Nephelite porphyry (sussexite).	In W. T., p. 307.
3	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 201.
4	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
5	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
6	Calamity Gulch, Black Hills, South Dakota.	J. D. Irving.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
7	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
8	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
9	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
10	Green Mountain, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 209.
11	Whitetail Gulch, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
12	Squaw Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
13	Annie Creek, Black Hills, South Dakota.	Flintermann.	J. D. Irving, An. N. Y. Ac. Sci., XII, p. 272, 1899.	Phonolite.	In W. T., p. 403.
14	Homestake Mine, Lead, South Dakota.	W. J. Sharwood.	W. J. Sharwood, Ec. G., VI, p. 731, 1911.	Phonolite.	Altered.
15	Megal, Velay.	M. Boule.	M. Boule, B. Sv. Ct. G. Fr., IV, No. 28, p. 152, 1892.	Phonolite.	In W. T., p. 403.
16	Puy Grioux, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 338, 1902.	Phonolite.	
17	La Terrisse, Cantal, Auvergne.	F. Fouqué.	F. Fouqué, B. Soc. M. Fr., XXV, p. 340, 1902.	Phonolite.	

PHONOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
18 D4, V	58.70	22.36	5.08	n. d.	1.27	3.39	5.13	5.45	n. d.			trace		SO ₂ trace	101.38	
19 D4, V	54.97	25.84	6.29	n. d.	1.13	5.21	4.49	3.52	n. d.			trace			101.45	
20 D4, V	55.90	22.70	4.20	n. d.	0.96	1.25	9.20	6.78	0.87		0.37				102.23	
21 C3, V	53.33	21.33	2.66	1.75	0.63	1.44	10.34	6.13	0.88		0.40		1.15		100.04	
22 D4, V	53.09	23.81	3.92	n. d.	1.13	1.29	10.41	6.31	0.67		0.29		0.42		101.34	
23 C2, IV	51.04	20.47	1.89	2.19	0.97	2.62	11.62	3.52	5.85		0.27	0.27		CO ₂ 0.62	101.35	2.460
24 B3, IV	48.83	18.71	4.16	1.91	1.02	5.19	10.63	3.04	5.52						99.01	
25 B4, V	52.24	21.08	4.41	n. d.	0.60	2.68	4.58	6.43	8.33					SO ₂ trace Cl 0.08	100.43	
26 C2, IV	45.17	18.27	1.39	6.64	2.44	2.27	11.35	5.64	1.93		2.70	1.40			99.20	2.63
27 C4, V	58.34	23.05	2.07	n. d.	trace	0.50	1.79	12.22	1.53		0.35		trace	BaO 0.66	100.51	
28 C4, V	56.72	21.04	n. d.	4.63	1.13	4.13	4.33	6.28			1.74				100.00	
29 C4, V	56.47	18.66	n. d.	5.83	trace	4.79	7.81	4.87							100.00	
30 C4, V	52.03	20.00	n. d.	5.90	1.52	4.42	9.30	5.22			1.32		0.22		99.93	
31 C4, V	50.70	20.32	n. d.	4.51	2.09	3.58	5.05	6.23			5.68			FeS ₂ 1.84	100.00	
32 C4, V	50.69	21.85	n. d.	4.51	0.25	7.77	1.28	2.83			0.82				100.00	
33 C4, V	50.66	21.18	n. d.	5.42	2.65	7.72	5.06	3.77			2.15		0.25	SO ₂ 1.14	100.00	

PHONOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
18	Roc Blanc, Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Phonolite.	In W. T., p. 403.
19	La Malvalle, Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Phonolite.	In W. T., p. 403.
20	Foia, Serra de Monchique, Portugal.	Student of Jannasch.	Kraatz-Koschlau and Hackmann, T. M. P. M., XVI, p. 257, 1896.	Tinguaite porphyry.	SiO ₂ and Na ₂ O doubtful. In W. T., p. 403.
21	Foia, Serra de Monchique, Portugal.	Student of Jannasch.	Kraatz-Koschlau and Hackmann, T. M. P. M., XVI, p. 257, 1896.	Tinguaite porphyry.	In W. T., p. 403.
22	Foia, Serra de Monchique, Portugal.	Student of Jannasch.	Kraatz-Koschlau and Hackmann, T. M. P. M., XVI, p. 257, 1896.	Tinguaite porphyry.	Al ₂ O ₃ doubtful. In W. T., p. 403.
23	Elfdalen, Dalarne, Sweden.	P. Mann.	P. Mann, N. J., 1884, II, p. 193.	Phonolite.	In W. T., p. 303.
24	Elfdalen, Dalarne, Sweden.	G. T. Prior.	G. T. Prior, Min. Mag., XIII, p. 87, 1901.	Cancrinite tinguaite.	"Na ₂ O low?"
25	Schorenberg, Eifel, Rheinland.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn, XLVIII, p. 254, 1891.	Phonolite tuff.	In W. T., p. 403.
26	Michelsberg, Katzenbuckel, Odenwald.	G. Latterman.	W. Freudenberg, Mt. Bad. G. L.-A., V (1), p. 304, 1907.	Nephelite porphyry.	
27	Degenmatt, Kaiserstuhl, Baden.	A. Cathrein.	A. Knop, D. Kaiserst., p. 209, 1892.	Phonolite.	Na ₂ O and K ₂ O interchanged? In W. T., p. 213.
28	Kirchberg, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 221, 1892.	Phonolite.	Calculated to 100. 3.36 H ₂ O and 4.56 CaCO ₃ deducted. In W. T., p. 405.
29	Endthalde, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 235, 1892.	Analcite phonolite.	Calculated to 100. 6.82 CaCO ₃ deducted. In W. T., p. 405.
30	Eichwalde, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 225, 1892.	Hauyne phonolite.	Ignited before analysis. SO ₃ n. d. In W. T., p. 405.
31	Schelingen, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 239, 1892.	Phonolite.	Calculated to 100. 4.16 H ₂ O and 6.27 CaCO ₃ deducted. In W. T., p. 405.
32	Oberschaffhausen, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 232, 1892.	Natrolite phonolite.	Calculated to 100. 6.74 H ₂ O and 2.00 CaCO ₃ deducted. In W. T., p. 405.
33	Horberig, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 218, 1892.	Hauyne phonolite.	Calculated to 100. 6.35 H ₂ O and 3.07 CaCO ₃ deducted. In W. T., p. 405.

PHONOLITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
34 D4. V	49.69	21.05	n. d.	5.05	1.45	8.90	4.22	1.33	5.23					CO ₂ 1.35 SO ₂ 0.41 Cl none	98.68	
35 D2. V	57.69	20.44	2.32	1.47	0.70	3.18	7.51	4.74	1.70		0.66		trace	CO ₂ 0.42 X 0.34 SO ₂ 0.27 Cl 0.35 Li ₂ O trace	101.79	2.624
36 C4. V	55.32	20.25	4.05	n. d.	0.98	4.21	6.32	4.10	3.34		0.75				99.32	
37 B3. IV	54.98	18.26	6.88	2.42	1.96	5.82	3.84	2.19	1.99		0.76				99.10	
38 D3. V	54.63	18.02	9.04	0.92	1.87	4.20	3.42	2.27	3.10		0.78				98.25	
39 C3. V	54.65	22.75	3.40	2.18	2.19	2.04	6.61	5.25	0.76		1.09				100.92	2.575
40 C3. V	50.08	21.68	3.88	4.00	2.85	7.78	4.21	3.96	0.55		1.24				100.23	2.607
41 D4. V	58.64	17.61	2.35	n. d.	0.35	1.27	11.48	7.36	2.95						101.01	
42 D3. V	58.02	21.98	3.33	0.85	0.56	3.20	6.46	4.48	(2.25)			0.06	trace		98.94	
43 C3. V	57.59	21.38	1.69	0.84	0.40	3.25	5.04	5.76	4.45			0.70			101.10	
44 B3. IV	56.80	20.41	none	3.62	0.29	1.75	9.42	5.72	1.46		none	0.22		CO ₂ 0.26	100.41	
45 D4. V	52.85	15.50	11.70	n. d.	4.58	7.56	n. d.	7.54	n. d.						102.73	
46 C3. IV	55.38	18.46	4.72	6.28	1.19	3.93	7.55	2.94	0.36			0.42	0.19	Cl trace	101.42	
47 C4. V	62.72	16.27	6.83	n. d.	n. d.	1.06	8.47	4.99	n. d.						100.34	
48 B3. IV	56.17	19.25	4.77	2.72	0.21	1.26	6.08	4.66	4.09			0.21			99.42	
49 D3. V	56.12	21.32	2.59	3.29	0.56	2.30	5.79	4.81	1.54					Cl 0.34	98.66	
50 D4. V	54.52	15.84	6.42	4.53	0.98	4.20	4.38	4.23	3.64						98.74	
51 D4. V	51.15	29.38			0.34	4.59	13.80	0.95	n. d.						100.21	
52 C3. V	58.23	20.90	3.21	1.75	0.39	3.24	6.16	5.88	1.60				trace		101.36	

PHONOLITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
34	Horberig, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 224, 1892.	Hauyne phonolite.	In W. T., p. 405.
35	Linsberg, Rhöngebirge.	E. Möller.	E. Möller, N. J., 1888, I, p. 97.	Phonolite.	In W. T., p. 403.
36	Kalvarienberg, Poppenhausen, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., 1910, p. 514.	Phonolite.	
37	Dammerfeld, Rhöngebirge.	O. Dreher.	O. Dreher, In. Diss. Strassb., p. 8, 1911.	Phonolite.	9.84 per cent quartz in norm.
38	Dammerfeld, Rhöngebirge.	O. Dreher.	O. Dreher, In. Diss. Strassb., p. 8, 1911.	Phonolite.	Weathered from preceding.
39	Schackau, Rhöngebirge.	H. Gachot.	H. Gachot, Jb. Pr. G. L.-A., XXXIV (2), p. 15, 1913.	Trachyphonolite.	
40	Schackau, Rhöngebirge.	H. Gachot.	H. Gachot, Jb. Pr. G. L.-A., XXXIV (2), p. 15, 1913.	Trachyphonolite.	
41	Schönfeld, near Kamnitz, Bohemia.	A. Pelikan.	A. Pelikan, T. M. P. M., XXV, p. 117, 1906.	Analcite phonolite.	Alkalies uncertain. Cf. ref.
42	Kahlenberg, Mittelgebirge, Bohemia.	J. Hanamann.	J. Hanamann, Arch. Landdt. Böhm., VII (3), p. 55, 1890.	Phonolite.	Not in W. T.
43	Kibitschken, Mittelgebirge, Bohemia.	C. F. Eichleiter.	G. Irgang, T. M. P. M., XXVIII, p. 62, 1909.	Phonolite.	
44	Flur Ratschin, Bohemia.	F. Hanusch.	J. E. Hibschi, T. M. P. M., XXIX, p. 432, 1910.	Sodalite tinguaite.	No Fe ₂ O ₃ ? Cl n. d.
45	Le Braidi, Monte Vulture, Apulia, Italy.	Musaio.	Cited by W. Deecke, N. J. B. B., VII, p. 602, 1891.	Phonolite.	In W. T., p. 405.
46	Azeo, Digsa, Eritrea.	F. Manasse.	E. Manasse, Stud. Pet. Erit., p. 101, 1909.	Tinguaite.	
47	Turritable Waterfall, Victoria.	R. J. Lewis.	J. W. Gregory, Pr. R. Soc. Vict., XIV, p. 201, 1902.	Trachyphonolite.	
48	Acheron Point, Dunedin, Otago, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., XLII, p. 395, 1906.	Tinguaite.	
49	Mount Zion, Mount Cargill, Dunedin, New Zealand.	J. A. Bartrum.	J. A. Bartrum, Tr. N. Z. Inst., XLIV, p. 173, 1912.	Phonolite.	
50	See House, Dunedin, New Zealand.	P. Marshall.	P. Marshall, Q. J. G. S., LXII, p. 402, 1906.	Phonolite.	
51	Purakanui Cliffs, near Dunedin, New Zealand.	Allen and Fitzgerald (students).	G. H. F. Ulrich, Tr. Aust. A. A. S., III, p. 136, 1891.	Tinguaite.	In W. T., p. 405.
52	Greenland Harbor, Kerguelen Island.	C. Klement.	A. Renard, Pet. Oc. Isllds., p. 136, 1889.	Phonolite.	In W. T., p. 405.

LEUCITE PHONOLITE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 C4. V	55.22	23.34	2.16	n. d.	0.36	2.25	3.14	5.72	8.76					SO ₃ trace Cl 0.14	101.09	
2 C4. V	55.18	23.03	2.85	n. d.	0.25	1.06	5.98	8.43	2.62					SO ₃ 0.44 Cl 0.32	100.16	
3 C4. V	53.25	24.20	3.37	n. d.	trace	1.03	5.73	5.48	6.64					Cl trace	99.70	
4 C4. V	50.95	21.43	3.50	n. d.	trace	4.87	6.81	6.66	10.20					Cl trace	100.46	
5 D4. V	52.33	21.42	n. d.	8.14	1.97	7.88	4.97	2.57			0.72				100.00	
6 D4. V	59.69	16.22	1.93	8.17	2.72	4.80	1.03	3.09	1.54			trace	0.44	SO ₃ 0.64 Cl trace	100.27	
7 C3. V	55.26	16.36	5.26	2.90	1.14	3.90	4.08	8.82	1.20		0.36				99.28	

ESSEXITE, ETC.

1 B3. IV	44.31	17.20	4.64	3.73	6.57	10.40	4.45	3.64	3.30	0.77			0.10		99.11	
2 B3. IV	43.18	15.24	7.61	2.67	5.81	10.63	5.68	4.07	3.57					SO ₃ 0.94 Cl none	99.40	2.93
3 B3. IV	50.55	20.48	2.66	4.02	4.24	7.30	8.37	2.27	0.44					Cl trace	100.33	
4 C3. V	49.61	19.18	2.12	5.01	4.94	10.05	5.62	1.04	3.55			0.27		SO ₃ trace	101.39	2.782
5 C2. IV	47.66	14.33	4.22	8.19	6.74	10.15	2.87	3.06	0.42		3.29	0.48			101.41	
6 C3. V	47.0	22.0	3.6	4.7	4.1	6.1	4.0	2.1	6.4		0.6				100.6	
7 B4. V	49.67	17.99	13.06	n. d.	3.06	6.63	6.21	2.62	0.86						100.10	
8 C4. IV	46.53	14.31	3.61	8.15	6.56	12.13	4.95	1.58	0.20		2.99		0.22		101.23	2.96
9 D2. V	45.66	11.64	3.57	10.61	11.08	9.11	2.60	0.44	n. d.		2.75	0.26			97.72	
10 D4. V	42.08	20.03	7.61	n. d.	3.52	10.62	(4.50)		4.54			1.59		CO ₂ 5.51	100.00	
11 B3. IV	39.64	16.98	6.61	9.31	6.65	10.58	5.95	3.09	1.32						100.13	

LEUCITE PHONOLITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Bell, Laacher See, Rheinland.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn, XLVIII, p. 265, 1891.	Leucitophyre.	In W. T., p. 405.
2	Rieden, Laacher See, Rheinland.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn, XLVIII, p. 246, 1891.	Leucite phonolite.	In W. T., p. 207.
3	Rieden, Laacher See, Rheinland.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn, XLVIII, p. 246, 1891.	Leucite phonolite.	In W. T., p. 405.
4	Rieden, Laacher See, Rheinland.	K. Busz.	K. Busz, Vh. Nh. Ver. Bonn, XLVIII, p. 244, 1891.	Leucitophyre.	In W. T., p. 405.
5	Oberrothweil, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 229, 1892.	Leucite phonolite.	Calculated to 100. 7.00 H ₂ O and 4.30 CaCO ₃ deducted. In W. T., p. 405.
6	Proceno, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, N. J. B. B., VI, p. 26, 1889.	Leucite phonolite.	In W. T., p. 405 Cf. No. 30, I.5.2.3.
7	Madonna di Lauro, Vetralla, near Viterbo, Italy.	A. Röhrig.	H. S. Washington, J. G., IV, p. 849, 1896.	Leucite trachyte.	In W. T., p. 251.

ESSEXITE, ETC.

1	Gordons Butte, Crazy Mountains, Montana.	E. A. Schneider.	J. E. Wolff, U. S. G. S. B. 150, p. 201, 1898.	Theralite.	In W. T., p. 349.
2	Martinsdale, Crazy Mountains, Montana.	J. E. Wolff.	J. E. Wolff, N. Transcont. Surv., Sep., p. 10, 1885.	Theralite.	In W. T., p. 353.
3	Cuyamas, San Luis Obispo County, California.	V. Lenher.	H. W. Fairbanks, B. Dep. G. Un. Cal., I, p. 293, 1895.	Teschenite.	In W. T., p. 305.
4	Point Sal, California.	H. W. Fairbanks.	H. W. Fairbanks, B. Dep. G. Un. Cal., II, p. 30, 1896.	Teschenite.	In W. T., p. 303.
5	Barra do Guarahu, Jacupiranga, Sao Paulo, Brazil.	Florence.	O. A. Derby, pers. com.	Essexite.	Published?
6	Puy St. Sandoux, Limagne, Puy de Dome, Auvergne.	Arsандаux.	P. Glangeaud, B. Sv. Ct. G. Fr., XIX, No. 123, p. 86, 1909.	Teschenite.	
7	Monchique, Portugal.	Student of Jannasch.	Kraatz-Köschlau and Hackman, T. M. P. M., XVI, p. 239, 1896.	Essexite.	In W. T., p. 411.
8	Kunjok Valley, Kola, Finland.	F. Eichleiter.	F. Eichleiter, Vh. G. R.-A. Wien, XXVII, p. 217, 1893.	Theralite.	In W. T., p. 349.
9	Penikkavaara, Kuonosamo, Finland.	A. Zilliacus.	V. Hackman, B. C. G. Fin., XI, p. 29, 1900.	Essexite.	In W. T., p. 411.
10	Sßhla, Silesia.	C. E. M. Rohrbach.	C. E. M. Rohrbach, T. M. P. M., VII, p. 49, 1886.	Teschenite.	Alkalies by difference. Not fresh. In W. T., p. 457.
11	Praya, Cape Verde Islands.	F. Kertscher.	F. Eigol, T. M. P. M., XI, p. 98, 1890.	Teschenite.	In W. T., p. 353.

TRACHYDOLERITE.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 B3, IV	54.12	18.77	8.20	2.14	1.17	3.98	5.63	4.03	2.45						100.49	2.63
2 B3, IV	53.57	19.14	8.51	3.05	1.01	4.13	4.76	3.98	2.88				trace		101.05	2.71
3 B3, IV	42.14	13.13	3.49	7.97	4.74	12.13	4.78	2.89	0.98		2.86		3.41	CO ₂ SO ₃ Cl 0.62 none 0.27	99.92	2.922
4 C3, V	53.27	16.49	5.11	2.30	3.39	8.78	3.66	5.24	1.81	0.83	0.08	0.41	trace	Cl 0.05	101.42	
5 D3, V	54.24	18.08	2.18	3.53	0.88	5.01	7.29	5.01	1.79					Cl 0.63	98.64	
6 C3, V	50.43	18.00	3.78	5.65	2.91	5.76	5.76	4.79	1.37					Cl 0.38	98.83	
7 D3, V	49.02	19.50	4.37	6.60	2.14	6.78	7.35	1.70	1.18						98.64	
8 C4, V	55.78	18.12	8.60	n. d.	1.91	5.78	5.50	2.62	1.28						99.59	
9 C4, V	53.30	21.10	8.90	n. d.	2.44	5.45	4.81	1.97	2.25						100.22	
10 C4, V	53.15	20.76	9.55	n. d.	2.42	5.60	4.50	2.21	1.71						99.90	

MONCHIQUEITE, ETC.

1 C3, V	45.58	15.87	4.65	6.37	8.32	9.91	3.42	1.61	3.14				trace		98.87	
2 D4, V	45.13	18.06	11.88	0.32	1.12	10.17	3.57	6.06	3.04			0.39			99.74	
3 D4, V	40.37	17.86	14.45	0.38	1.63	17.61	1.29	0.83	4.47						99.39	
4 C4, V	41.37	16.25	16.93	n. d.	4.57	12.35	4.18	3.98	0.45						100.08	
5 D4, V	40.47	11.96	17.44	n. d.	3.10	16.80	1.90	4.21	3.60						99.38	3.102
6 D4, V	31.80	18.78	15.20	n. d.	3.32	14.60	1.10	5.07	8.10			0.95			98.92	
7 D4, V	38.07	17.92	14.08	n. d.	8.87	11.70	0.96	2.23	5.50						99.33	
8 C4, V	46.98	17.07	1.85	7.02	8.29	12.15	2.54	0.53	4.86			0.09			101.38	3.20
9 C2, IV	43.48	15.13	6.40	4.14	5.14	10.31	4.23	2.83	3.17	0.50	2.52	0.29		CO ₂ SO ₃ 0.27 1.51	99.92	

TRACHYDOLERITE.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Löwenburg, Siebengebirge, Rheinland.	H. Müller.	H. Müller, N. J. B. B., XXIII, p. 432, 1907.	Trachydolerite.	
2	Löwenburg, Siebengebirge, Rheinland.	H. Müller.	H. Müller, N. J. B. B., XXIII, p. 432, 1907.	Trachydolerite.	
3	Biliner Skale, near Lukow, Bohemia.	F. Hanusch.	J. E. Hibschi, T. M. P. M., XXIV, p. 281, 1905.	Trachydolerite.	MnO high.
4	Santa Teresa Volcano, Phlegrean Fields, Italy.	F. S. Starrabba.	F. S. Starrabba, At. Ac. Sc. Nap. (2), XIV, No. 7, p. 12, 1910.	Trachydolerite.	
5	Butlers Peaks, Mount Cargill, Dunedin, New Zealand.	J. A. Bartrum.	J. A. Bartrum, Tr. N. Z. Inst., XLIV, p. 169, 1912.	Trachydolerite.	
6	Mount Cargill, Dunedin, New Zealand.	J. A. Bartrum.	J. A. Bartrum, Tr. N. Z. Inst., XLIV, p. 167, 1912.	Trachydolerite.	
7	Pine Hill, Mount Cargill, Dunedin, New Zealand.	J. A. Bartrum.	J. A. Bartrum, Tr. N. Z. Inst., XLIV, p. 167, 1912.	Trachydolerite.	
8	Amaua, Tutuila, Samoa.	Hobein.	M. Weber, Abh. Bay. Ak. W., XXIV, p. 297, 1909.	Trachydolerite.	
9	Aunuu Island, Samoa.	Hobein.	M. Weber, Abh. Bay. Ak. W., XXIV, p. 302, 1909.	Trachydolerite.	
10	Afono, Tutuila, Samoa.	Hobein.	M. Weber, Abh. Bay. Ak. W., XXIV, p. 300, 1909.	Trachydolerite.	

MONCHIQUTE, ETC.

1	Shelburne Point, Burlington, Vermont.	H. T. Vulté.	J. F. Kemp in Weed and Pirsson, U. S. G. S. B. 139, p. 116, 1896.	Monchiquite.	New analysis of next number. In W. T., p. 459.
2	Shelburne Point, Burlington, Vermont.	W. H. Morrison.	Kemp and Marsters, U. S. G. S. B. 107, p. 34, 1893.	Monchiquite.	In W. T., p. 459.
3	Burlington, Vermont.	W. H. Morrison.	Kemp and Marsters, U. S. G. S. B. 107, p. 34, 1893.	Monchiquite.	In W. T., p. 459.
4	Beemerville, Sussex County, New Jersey.	F. W. Love.	J. F. Kemp, Tr. N. Y. Ac. Sc., XI, p. 69, 1892.	Ouachitite.	In W. T., p. 459.
5	Rutans Hill, near Beemerville, Sussex County, New Jersey.	J. F. Kemp.	J. F. Kemp, A. J. S., XXXVIII, p. 133, 1889.	Ouachitite.	In W. T., p. 459.
6	Beemerville, Sussex County, New Jersey.	J. F. Kemp.	J. F. Kemp, A. J. S., XXXVIII, p. 133, 1889.	Ouachitite.	In W. T., p. 459.
7	Tatumville, Saline County, Arkansas.	J. F. Kemp.	J. F. Kemp in J. F. Williams, Ig. R. Ark., p. 399, 1891.	Ouachitite.	In W. T., p. 459.
8	Angel Island, California.	F. L. Ransome.	F. L. Ransome, B. Dep. G. Un. Cal., I, p. 231, 1884.	Fourchite.	In W. T., p. 459.
9	Offenthal, Odenwald.	F. Herberger.	G. Klemm, Nb. Ver. Erdk. (4), XXVIII, p. 37, 1907.	Monchiquite.	Cf. No. 25, III.6.3.4.

MONCHIQUEITE, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
10 C2, IV	41.00	10.05	4.60	7.20	9.23	15.85	2.32	3.20	4.01		3.37	0.39			101.22	
11 D3, V	47.19	17.25	3.00	11.40	0.63	10.84	2.81	3.21	1.10		0.49	0.12	trace	(Ce, Di) ₂ O ₃ 1.79 NiO 1.35	101.18	

NEPHELITE TEPHRITE, ETC.

1 C3, IV	44.43	17.89	4.00	4.94	2.40	12.60	2.55	3.02	6.25		1.40		trace		99.48	
2 D4, V	38.35	9.18	20.32	n. d.	13.78	11.76	2.77	2.02	1.20						99.38	3.22
3 C3, V	47.3	20.5	3.2	5.1	4.6	6.5	3.9	1.8	7.0		0.5				100.4	
4 C3, V	44.0	16.9	8.6	8.7	5.9	9.9	4.0	1.0	1.9						100.9	
5 C3, V	42.9	21.1	3.7	8.3	5.2	11.6	4.2	0.7	3.1						100.8	
6 D4, V	48.05	18.65	2.90	4.70	2.28	7.50	6.19	5.16	n. d.		2.60		0.28		98.31	2.665
7 C4, V	42.20	10.32	n. d.	11.85	14.82	12.96	3.44	0.64			2.92				100.00	
8 C4, V	47.57	17.52	0.80	10.77	9.53	1.69	1.10	2.66							99.86	2.88
9 D3, V	44.20	17.03	5.30	5.70	7.20	9.10	5.90	2.95	3.83						101.21	
10 C3, V	43.18	12.66	3.66	8.69	13.74	12.51	3.19	1.22	1.42			0.88			101.15	2.99
11 D3, V	42.68	17.90	2.45	7.22	8.48	9.78	5.91	3.63	3.02						101.07	2.81
12 D4, V	42.93	20.13	7.30	n. d.	2.30	10.95	8.99	2.50	0.79			1.50	0.60		97.99	
13 C2, IV	42.02	13.86	5.81	5.84	10.39	11.43	3.61	0.86	2.41		1.88	0.11	0.31	CO ₂ 0.56 X 1.99 Cl 0.20	101.28	3.028
14 C3, V	52.18	19.88	4.77	1.99	1.91	6.66	3.65	3.45	2.75		1.76				99.00	
15 C3, V	51.65	18.42	7.95	1.97	1.80	7.92	3.59	2.58	2.44		1.52				99.84	
16 C3, V	51.25	22.10	4.51	1.39	1.74	7.07	4.32	2.79	2.45		1.55				99.17	

MONCHIQUEITE, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	Leeuwfontein, Pretoria, Transvaal.	Pisani.	H. A. Brouwer, Transv. Nephys., p. 94, 1910.	Amphibole monchiquite.	"H ₂ O, possibly all CO ₂ ."
11	Girnan, Madras, India.	Not stated.	J. W. Evans, pers. com.	Monchiquite.	Published?

NEPHELITE TEPHRITE, ETC.

1	Cape Fletcher, Canning Peninsula, East Greenland.	N. Sahlbom.	O. Nordenskjöld, Med. Grönl., XXVII, p. 207, 1908.	Nephelite tephrite.	"CaO and MgO uncertain, in- terchanged?"
2	Pilot Knob, near Austin, Texas.	J. F. Kemp.	J. F. Kemp, Am. G., VI, p. 293, 1890.	Nephelite basalt.	In W. T., p. 457.
3	Puy St. Sandoux, Limagne, Puy de Dome, Auvergne.	H. Arsandaux.	P. Glangeaud, B. Sv. Ct. G. Fr., XIX, No. 123, p. 86, 1909.	Tephrite.	
4	Puy St. Sandoux, Limagne, Puy de Dome, Auvergne.	H. Arsandaux.	P. Glangeaud, B. Sv. Ct. G. Fr., XIX, No. 123, p. 86, 1909.	Olivine tephrite.	
5	Puy St. Sandoux, Limagne, Puy de Dome, Auvergne.	H. Arsandaux.	P. Glangeaud, B. Sv. Ct. G. Fr., XIX, No. 123, p. 86, 1909.	Olivine nephelinite.	
6	Picota, Serra Monchique, Portugal.	G. Pajkull.	Kraatz-Koschlau and Hackman, T. M. P. M., XVI, p. 275, 1896.	Nephelite tephrite.	In W. T., p. 457.
7	Lützelberg, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 274, 1892.	Basanite.	Calculated to 100. 3.00 H ₂ O deducted. In W. T., p. 457.
8	Reiffenberg, near Schorbach, Hesse.	H. Wolff.	H. Wolff, Sb. Ph. Ges. Erl., XXII, p. 134, 1890.	Nephelite basanite.	In W. T., p. 335.
9	Steinerberg, near Schorbach, Hesse.	Keim.	H. Wolff, Sb. Ph. Ges. Erl., XXII, p. 134, 1890.	Nephelite basanite.	In W. T., p. 459.
10	Ibra Kuppe, Oberaula, Hesse.	H. Wolff.	H. Wolff, Sb. Ph. Ges. Erl., XXII, p. 138, 1890.	Nephelite basalt.	3 decimals. In W. T., p. 351.
11	Kronberg, near Schorbach, Hesse.	H. Wolff.	H. Wolff, Sb. Ph. Ges. Erl., XXII, p. 136, 1890.	Nephelite basanite.	3 decimals. In W. T., p. 353.
12	Rossberg, near Darmstadt, Hesse.	E. Becker.	E. Becker, Ref., N. J., I, p. 370, 1906.	Nephelinite.	
13	Hunrodsberg, near Cassel, Hesse-Nassau.	O. Fromm.	O. Fromm, Z. D. G. G., XLIII, p. 75, 1891.	Nephelite basalt.	In W. T., p. 345.
14	Hozzelberg, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 501, 1910.	Nephelite tephrite.	
15	Steinhauk, near Obermünst, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 501, 1910.	Nephelite tephrite.	
16	Steinhauk, near Obermünst, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 501, 1910.	Nephelite tephrite.	

NEPHELITE TEPHRITE, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
17 C4. V	50.33	22.57	4.63	n. d.	3.25	9.74	3.90	1.73	1.97		2.08				100.40	
18 C4. V	50.24	20.25	8.11	0.74	2.74	7.94	4.84	1.70	2.32		1.63				100.51	
19 C3. V	48.78	19.39	6.29	3.41	4.05	8.72	4.09	1.53	1.75		1.99				100.00	
20 C3. V	45.67	17.84	9.54	4.04	3.85	9.78	3.88	1.44	1.97		1.57				99.58	
21 D3. V	45.46	22.20	6.95	4.19	3.07	9.57	3.38	1.49	0.76		1.50				98.57	
22 C3. V	45.25	17.69	7.76	4.62	3.68	9.88	2.87	2.27	2.36		2.78				99.16	
23 C3. V	44.37	17.49	7.48	3.39	5.21	10.98	2.56	0.62	3.28		3.75				99.13	
24 D2. V	44.10	12.80	5.43	5.73	10.66	10.57	2.84	1.24	3.90		2.46	0.55	0.18	CO ₂ 0.36 X 0.71 SO ₂ 0.09 Cl 0.17	101.79	2.956
25 D3. V	42.68	15.02	7.95	6.09	4.99	9.77	4.97	1.42	3.61		2.48		0.21	CO ₂ 0.46 X 2.20 Cl trace	101.95	2.925
26 B3. IV	41.18	17.94	9.81	1.16	11.18	12.38	3.15	0.93	2.03		0.50				100.26	3.064
27 C3. V	40.73	20.70	4.26	8.38	5.32	10.78	7.28	0.60	2.00		0.46	0.49	trace	CO ₂ trace Cl trace NiO trace	101.00	3.141
28 C2. IV	39.08	22.13	3.40	5.72	5.44	12.56	6.85	1.77	1.28		0.85	0.50	trace	Cl trace S trace Cr ₂ O ₃ trace	99.58	2.910
29 C3. V	39.03	21.57	8.98	6.82	4.52	12.58	3.82	2.63	0.55						100.50	3.145
30 C4. V	42.71	17.05	0.92	7.66	5.49	12.31	10.48	2.81	0.60		0.60	0.96			101.59	3.095
31 D4. V	52.65	28.80	1.45	n. d.	0.16	12.60	3.80	0.38	0.80						100.62	
32 B4. V	52.55	14.63	10.70	n. d.	1.71	6.37	3.83	3.48	6.72			0.63		SO ₂ trace Cl trace	100.62	
33 C2. IV	45.56	14.43	7.71	6.07	0.87	9.23	5.57	2.45	2.79	0.49	1.73	1.02	1.47	CO ₂ 0.25 SO ₂ trace	99.64	2.759
34 D2. V	45.28	12.95	9.83	4.73	3.82	10.91	3.34	2.03	1.88	0.69	1.60	0.70	0.91	CO ₂ 0.16 SO ₂ trace	98.83	2.785
35 C2. IV	40.58	13.01	4.72	6.09	5.25	13.57	2.95	2.17	4.87	1.66	3.07	1.58	0.62	CO ₂ 0.10 SO ₂ none Cl 0.09	100.33	2.856
36 C3. V	38.39	17.38	6.49	6.83	7.12	13.14	4.79	2.33	1.01		0.19	1.74	1.41	CO ₂ 0.21 SO ₂ none	101.03	3.05
37 C3. V	54.71	20.29	5.44	4.60	2.03	2.10	6.42	1.58	2.00		trace				99.87	

NEPHELITE TEPHRITE, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
17	Dedgesstein, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 501, 1910.	Nephelite tephrite.	
18	Kirschberg, near Rasdorf, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 501, 1910.	Nephelite tephrite.	
19	Bildstein, near Poppenhausen, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 500, 1910.	Nephelite tephrite.	
20	Suchenberg, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 500, 1910.	Nephelite tephrite.	
21	Rückersberg, near Eiterfeld, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 500, 1910.	Nephelite tephrite.	
22	Hoherod, near Hofbieber, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 500, 1910.	Nephelite tephrite.	
23	Tannenfels, Rhöngebirge.	Dürrfeld.	H. Bücking, Sb. Pr. Ak. W., p. 500, 1910.	Nephelite tephrite.	
24	Linsberg, Rhöngebirge.	E. Möller.	E. Möller, N. J., I, p. 105, 1888.	Nephelite basanite.	In W. T., p. 459.
25	Linsberg, Rhöngebirge.	E. Möller.	E. Möller, N. J., I, p. 102, 1888.	Nephelite basanite.	In W. T., p. 459.
26	Kreuzberg, Rhöngebirge.	E. v. Seyfried.	E. v. Seyfried, Jb. Pr. G. L.-A., XVII, p. 20, 1897.	Basanite.	In W. T., p. 347.
27	Volkersberg, near Brückenau, Rhöngebirge.	H. Lenk.	H. Lenk, Vh. Ph. Ges. Wurz., XXI, p. (76), 1887.	Nephelite basalt.	In W. T., p. 351.
28	Leubach, Rhöngebirge.	H. Lenk.	H. Lenk, Vh. Ph. Ges. Wurz., XXI, p. 54, 1887.	Nephelinite.	In W. T., p. 305.
29	Kreuzberg, Rhöngebirge.	E. v. Seyfried.	E. v. Seyfried, Jb. Pr. G. L.-A., XVII, p. 17, 1897.	Nephelite basalt.	In W. T., p. 305.
30	Babenik, Grossdehna, Saxony.	O. Beyer.	O. Beyer, T. M. P. M., X, p. 14, 1889.	Nephelite basalt.	Na ₂ O high. Cf. ref. In W. T., p. 459.
31	Kreutzberg, near Schluckenau, Bohemia.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, LII, p. 146, 1903.	Nephelite basanite.	
32	Liebwerda, Bohemia.	F. Ullik.	J. E. Hibschi, T. M. P. M., XV, p. 237, 1896.	Tephrite tuff.	H ₂ O includes CO ₂ . In W. T., p. 459.
33	Schichenberg, near Tetschen, Bohemia.	F. Hanusch.	J. E. Hibschi, T. M. P. M., XIV, p. 104, 1894.	Nephelite tephrite.	Lower flow. In W. T., p. 343.
34	Schichenberg, near Tetschen, Bohemia.	F. Hanusch.	J. E. Hibschi, T. M. P. M., XIV, p. 105, 1894.	Nephelite-leucite tephrite.	In W. T., p. 459.
35	Schanzberg, Bohemia.	F. Hanusch.	J. E. Hibschi, T. M. P. M., XXIII, p. 342, 1904.	Nephelinite.	Not fresh.
36	St. Georgsberg, Randnitz, Bohemia.	J. Hoffmann.	J. Hoffmann, Ref. N. J., II, p. 59, 1898.	Nephelite basalt.	In W. T., p. 459.
37	Lumbwa, Uganda.	M. Goldschlag.	M. Goldschlag, N. J. Ob., p. 592, 1912.	Nephelite tephrite.	

LEUCITE TEPHRITE, ETC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 D3. V	52.06	23.13	8.52	1.75	2.24	3.30	5.37	3.10	1.17		0.16	0.20	trace		101.00	
2 D4. V	43.49	15.43	8.52	n. d.	3.63	8.36	(12.77)		4.49					CO ₂ 3.31	100.00	
3 D4. V	50.43	25.04	3.48	n. d.	4.51	7.49	5.17	1.08	2.61						99.71	
4 D4. V	51.83	18.62	8.02	n. d.	n. d.	6.78	3.62	4.71	5.86			0.12			99.56	
5 D2. V	50.98	18.94	5.82	1.83	0.32	6.88	3.22	4.67	4.01		1.23	0.21		Cl S trace trace	98.11	2.548
6 C3. V	44.73	14.75	6.59	4.59	7.97	9.41	3.26	0.84	5.90		2.88				100.92	
7 D3. V	42.30	14.77	8.89	3.64	7.52	9.97	3.20	1.13	2.85	1.50	3.07				98.84	
8 B3. IV	41.13	18.18	4.71	7.64	10.59	13.20	2.00	1.59	1.74						100.78	
9 B3. IV	52.34	19.90	6.57	0.55	2.26	6.35	5.66	2.68	3.65	0.41	0.14	0.09		SO ₂ 0.02	100.62	2.623
10 C2. IV	46.84	13.98	8.99	5.46	0.80	10.41	3.59	2.59	2.69	0.47	1.88	0.59	1.79	CO ₂ SO ₂ 0.30 trace	100.38	2.794
11 D3. V	56.32	17.07	3.11	6.03	2.05	6.53	2.24	4.03	2.04			0.93	0.13		100.48	2.492
12 D3. V	56.07	16.31	1.64	8.39	3.04	5.94	1.22	5.27	1.17			0.92	0.14		100.09	2.552
13 D3. V	55.08	17.52	2.11	6.17	2.41	6.19	1.37	4.32	4.03			1.02	0.10		100.32	2.492
14 D3. V	55.11	16.07	3.04	8.46	3.10	6.46	1.58	5.07	0.89			0.75			100.53	2.546
15 D3. V	52.71	14.41	2.22	8.03	5.11	11.06	1.34	2.55	1.01			1.47	0.12		100.03	2.816
16 D4. V	52.35	15.08	trace	8.38	5.41	11.12	1.28	4.12	1.84			0.85	trace		100.43	2.735
17 D3. V	52.16	15.03	3.17	8.42	4.69	10.07	2.38	2.47	0.72			1.15	0.24		100.50	2.749

LEUCITE TEPHRITE, ETC.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Cerro de las Virgenes, Lower California, Mexico.	Jäger.	K. v. Chrústchoff, T. M. P. M., VI, p. 168, 1885.	Leucitophyre.	In W. T., p. 461.
2	Santa Cruz, Rio de Janeiro, Brazil.	Not stated.	E. Hussak, N. J., II, p. 152, 1892.	Leucite tephrite.	Alkalies by difference. In W. T., p. 461.
3	Clermain, near Cluny, Maconnais, France.	Not stated.	Michel-Levy and Lacroix, B. Sv. Ct. G. Fr., VII, No. 45, p. 9, 1895.	Leucotephrite.	In W. T., p. 461.
4	Mondhalde, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L.-A., IV (2), p. 97, 1901.	Mondhaldeite.	Not in W. T.
5	Föhrenberg, Kaiserstuhl, Baden.	K. Gruss.	K. Gruss, Mt. Bad. G. L.-A., IV (2), p. 97, 1901.	Mondhaldeite.	In W. T., p. 271.
6	Steinberg, near Giessen, Hesse.	A. Streng.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 456, 1908.	Leucite basanite.	
7	Arnsburg, near Giessen, Hesse.	A. Streng.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 456, 1908.	Leucite basanite.	
8	Eckmannsbain, Vogelsberg, Hesse.	H. Sommerlad.	H. Sommerlad, N. J., II, p. 223, 1884.	Leucite basalt.	In W. T., p. 347.
9	Birkigt, near Tetschen, Bohemia.	R. Pfohl.	J. E. Hibsch, T. M. P. M., XIV, p. 108, 1894.	Nosean-leucite tephrite.	In W. T., p. 283.
10	Falkenberg, near Tetschen, Bohemia.	F. Hanusch.	J. E. Hibsch, T. M. P. M., XIV, p. 107, 1894.	Nephelite-leucite tephrite.	In W. T., p. 315.
11	Montalto, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., p. 115, 1888.	Leucite basanite.	Also in N. J. B. B., VI, p. 28, 1889. In W. T., p. 461.
12	Montalto, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., p. 115, 1888.	Leucite basanite.	Also in N. J. B. B., VI, p. 28, 1889. In W. T., p. 461.
13	Montalto, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., p. 115, 1888.	Leucite basanite.	Also in N. J. B. B., VI, p. 28, 1889. In W. T., p. 461.
14	Montalto, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 115.	Leucite basanite.	Also in N. J. B. B., VI, p. 28, 1889. In W. T., p. 461.
15	Canonica, near Orvieto, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 108.	Leucitite.	Also in N. J. B. B., VI, p. 20, 1889. In W. T., p. 461.
16	Mezzano, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 106.	Leucite tephrite.	Also in N. J. B. B., VI, p. 19, 1889. In W. T., p. 315.
17	Monte Bisenzio, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 106.	Leucite tephrite.	Also in N. J. B. B., VI, p. 19, 1889. In W. T., p. 461.

LEUCITE TEPHRITE, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
18 D3. V	51.94	14.78	2.94	9.13	2.63	8.51	2.08	5.33	2.12			0.62	0.17		100.25	
19 D3. V	51.24	15.26	3.70	8.48	4.04	7.63	1.08	2.85	5.29			0.58	0.12		100.27	
20 D3. V	50.19	16.86	2.12	7.32	3.66	11.40	2.11	3.78	1.17			1.39	0.21		100.21	2.708
21 D3. V	49.63	11.90	2.64	9.16	8.02	12.78	1.08	3.58	1.27			trace	trace	Li ₂ O trace	100.06	2.876
22 D3. V	48.30	15.07	1.53	9.18	7.48	13.95	0.94	1.73	1.78			0.47	0.29		100.72	
23 D3. V	49.34	18.99	3.11	6.07	3.51	7.89	1.89	6.03	1.98			1.31	0.26		100.38	2.562
24 D3. V	49.23	15.04	1.39	9.03	8.02	13.58	1.07	1.54	0.93			0.17	0.37		100.37	
25 D3. V	49.18	16.07	1.17	8.94	5.43	13.26	1.25	2.07	1.62			0.41	0.42	SO ₂ 0.48	100.30	
26 D3. V	48.84	15.45	2.78	9.62	5.37	13.29	1.24	1.83	0.72			0.22	0.34	SO ₂ 0.56	100.26	
27 D3. V	47.61	17.38	2.03	7.24	6.21	15.61	0.86	1.81	0.64			0.61	0.21		100.21	2.731
28 D3. V	49.03	16.07	1.76	10.05	3.94	12.04	1.73	3.06	1.38			0.27	0.44	SO ₂ 0.57	100.34	
29 D3. V	48.75	16.03	1.83	10.12	4.02	11.72	1.89	2.94	1.39			0.31	0.42	SO ₂ 0.62	100.04	
30 D3. V	49.03	15.18	2.07	6.32	6.05	12.58	1.49	4.07	2.09			0.86	0.19		99.93	2.743
31 D3. V	48.51	14.56	3.21	8.19	4.12	10.69	2.15	4.24	2.80			0.95	0.16		99.58	2.726
32 D3. V	48.28	16.51	3.07	7.62	4.03	12.50	0.86	1.84	3.51			1.71	0.16		100.09	2.769
33 D3. V	48.09	13.60	2.52	9.36	6.75	13.05	1.41	3.07	1.62			0.41	0.10		99.98	2.762

LEUCITE TEPHRITE, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
18	Fosso Pantacciano, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 111.	Leucite basanite.	Also in N. J. B. B., VI, p. 23, 1889. In W. T., p. 461.
19	Toscanello, near Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 106.	Leucite tephrite.	Also in N. J. B. B., VI, p. 19, 1889. In W. T., p. 461.
20	San Magno, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 108.	Leucite tephrite.	Also in N. J. B. B., VI, p. 20, 1889. In W. T., p. 461.
21	Monte Jugo, near Lake Bolsena, Italy.	L. Ricciardi.	L. Ricciardi, At. Soc. It. Mil., XXVIII, p. 130, 1885.	"Basalt" (leucite).	Cf. No. 2, III.7.2.2. In W. T., p. 315.
22	Monte Jugo, near Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 108.	Leucite.	Also in N. J. B. B., VI, p. 20, 1889. Cf. No. 2, III.7.2.2. In W. T., p. 463.
23	Gradoli, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 119.	Leucite tephrite tuff.	Also in N. J. B. B., VI, p. 32, 1889. In W. T., p. 461.
24	Montefiascone, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 111.	Leucite basanite.	Also in N. J. B. B., VI, p. 23, 1889. In W. T., p. 461.
25	Montefiascone, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 108.	Leucite.	Also in N. J. B. B., VI, p. 20, 1889. In W. T., p. 463.
26	Montefiascone, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 108.	Leucite.	Also in N. J. B. B., VI, p. 20, 1889. In W. T., p. 463.
27	Montefiascone, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 111.	Leucite basanite.	Also in N. J. B. B., VI, p. 23, 1889. In W. T., p. 463.
28	Sassi Lanciati, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 108.	Leucite.	Also in N. J. B. B., VI, p. 20, 1889. In W. T., p. 463.
29	Sassi Lanciati, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 108.	Leucite.	Also in N. J. B. B., VI, p. 20, 1889. In W. T., p. 463.
30	Madonna dell' Olivo, Toscanello, near Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 111.	Leucite basanite.	Also in N. J. B. B., VI, p. 23, 1889. In W. T., p. 315.
31	Fosso Pantacciano, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 108.	Leucite.	Also in N. J. B. B., VI, p. 20, 1889. In W. T., p. 461.
32	Santa Trinita, Orvieto, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 106.	Leucite tephrite.	Also in N. J. B. B., VI, p. 19, 1889. In W. T., p. 463.
33	Valentano, Lake Bolsena, Italy.	L. Ricciardi.	C. Klein, Sb. Pr. Ak. W., 1888, p. 111.	Leucite basanite.	Also in N. J. B. B., VI, p. 23, 1889. In W. T., p. 463.

LEUCITE TEPHRITE, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
34 B3. IV	50.24	20.09	2.54	5.65	3.65	7.83	2.97	7.45	0.36				trace		100.78	
35 C3. V	57.63	20.88	0.18	5.15	0.96	3.82	3.14	6.39	1.66						99.81	2.57
36 B3. IV	56.96	16.60	5.92	3.11	1.45	4.00	3.76	7.81	0.35				0.36		100.32	2.63
37 C3. V	56.20	20.44	3.91	2.70	1.32	4.41	6.25	4.46	0.52						100.21	
38 C3. V	55.44	19.23	5.07	3.05	2.50	5.96	3.29	5.68	0.75			0.18	trace		100.15	
39 D3. V	54.97	16.88	4.39	3.39	1.23	4.59	7.91	5.30	0.21						99.87	2.60
40 C3. V	54.07	19.21	2.74	1.29	0.73	2.35	4.18	3.59	11.91			0.42			100.49	
41 C3. V	52.59	22.21	5.35	1.77	1.87	5.51	3.55	5.66	1.68						100.19	
42 B3. IV	53.80	15.61	4.71	4.77	2.22	6.45	4.91	6.71	1.46						100.64	2.64
43 C3. V	53.77	20.93	1.05	4.58	2.88	8.14	2.57	6.32	0.07						100.31	2.74
44 C3. V	52.07	12.73	10.28	4.88	2.62	5.78	4.85	6.18	0.41				0.45		100.25	2.68
45 D3. V	52.00	17.96	2.38	1.15	1.19	4.34	2.30	5.82	11.49				1.42		100.05	
46 D3. V	49.70	21.23	1.52	1.95	1.70	4.61	3.59	5.59	10.15			0.17			100.21	
47 D3. V	49.56	17.63	4.87	0.85	1.35	5.71	1.98	3.08	15.41			trace			100.44	
48 A4. IV	49.73	19.20	5.50	2.41	(2.63)	7.96	1.99	9.39	n. d.						100.00	
49 D4. V	51.42	18.57	n. d.	8.47	0.48	2.74	10.38	6.42	0.88			0.14	trace	SO ₂ 0.73	100.23	2.49
50 D4. V	48.38	19.03	n. d.	10.57	1.13	5.69	4.40	8.65	0.64		0.15	0.33	trace	SO ₂ 1.64	100.61	2.67
51 D4. V	47.50	28.38	3.68	n. d.	1.36	5.03	trace	4.60	6.00	3.40			trace	Cr ₂ O ₃ trace	99.95	2.35

LEUCITE TEPHRITE, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
34	Monte Cavallo, Orvieto, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 370, 1897.	Leucite tephrite.	In W. T., p. 297.
35	Fontana di Fiescoli, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Leucite tephrite.	
36	Carbognano, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Leucite tephrite.	
37	Vetralla, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Leucite tephrite.	
38	Vetralla, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 507, 1912.	Leucite tephrite tuff.	
39	Monte Fogliano, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Leucite tephrite.	
40	Near Canepina, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 507, 1912.	Leucite tephrite tuff.	
41	Fornace Falcioni, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 507, 1912.	Leucite tephrite tuff.	
42	Vetralla, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Leucite tephrite.	
43	Casale Lomellini, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Leucite tephrite.	
44	San Martino, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 506, 1912.	Leucite tephrite.	
45	Vetralla, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 507, 1912.	Leucite tephrite tuff.	
46	Ronciglione, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 507, 1912.	Leucite tephrite tuff.	
47	Civita Castellana, Vico Volcano, Viterbo, Italy.	G. Aichino.	V. Sabatini, Vulc. Cim., p. 507, 1912.	Leucite tephrite tuff.	
48	Madonna del Riposo, Bracciano, Italy.	H. S. Washington.	H. S. Washington, J. G., V, p. 49, 1897.	Leucite tephrite.	MgO by difference. Cf. No. 4, II. 6.2.2. In W. T., p. 305.
49	Tavolato, Alban Hills, near Rome, Italy.	G. Aichino.	V. Sabatini, Mem. C. G. It., X, p. 164, 1900.	Hauyne-leucite tephrite.	Cf. No. 2, I. 7.1.3. In W. T., p. 463.
50	Lago di Nemi, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. C. G. It., X, p. 164, 1900.	Hauyne-leucite tephrite.	In W. T., p. 463.
51	Via Ardeatina, Alban Hills, Italy.	Trottarelli.	A. Verri, B. Soc. G. It., XII, p. 72, 1893.	Leucite tuff.	In W. T., p. 463.

LEUCITE TEHPHRITE, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
52 D4. V	46.85	21.49	5.21	n. d.	0.96	8.54	trace	4.68	8.10	3.80			trace	Cr ₂ O ₃ trace	99.63	2.16
53 D4. V	46.59	27.12	5.83	n. d.	0.53	4.76	trace	2.04	8.90	3.90			trace	Cr ₂ O ₃ trace	100.67	2.02
54 C4. V	46.57	19.86	n. d.	8.97	1.82	10.38	3.13	7.48	1.29			0.44	0.93		100.87	2.67
55 C4. V	45.93	18.27	n. d.	9.39	4.41	10.98	3.99	6.28	0.83		0.09	0.39	0.06	SO ₃ trace	100.62	2.62
56 C4. V	45.71	17.90	n. d.	9.69	3.87	10.56	4.85	5.21	1.82		trace	0.34	0.54	SO ₃ 0.12	100.61	2.78
57 C4. V	45.02	22.57	n. d.	8.94	2.35	10.09	3.28	7.13	0.91			0.40	trace		100.69	2.83
58 D4. V	46.15	23.19	6.42	n. d.	2.25	8.52	trace	3.01	5.50	4.90			trace	Cr ₂ O ₃ trace	99.94	2.33
59 D4. V	47.68	31.64	11.48	n. d.	3.27	3.87	1.72	0.21	—		0.63	0.35			100.85	
60 D4. V	44.69	22.47	9.81	n. d.	5.32	10.54	(6.59)		0.58						100.00	
61 C3. V	49.23	17.69	6.87	2.03	4.20	12.73	2.05	5.18	0.80			0.30			101.08	2.885
62 C4. V	47.34	16.35	n. d.	10.23	4.26	11.02	3.09	5.96	0.63			0.46			99.34	2.81
63 C4. V	49.57	18.05	n. d.	9.44	2.52	9.38	3.26	6.55	0.43			0.23			99.43	2.81
64 D4. V	48.24	14.65	n. d.	10.33	5.57	14.32	3.04	2.46	0.13			0.04			98.78	2.91
65 C4. V	47.58	14.36	n. d.	10.63	2.14	12.94	3.31	7.00	0.25			0.32	0.85		99.44	2.88
66 D4. V	46.87	17.10	n. d.	9.41	4.78	11.35	3.79	5.54	0.18			0.43			99.45	2.57
67 D4. V	46.39	18.88	n. d.	8.51	7.58	12.45	2.46	2.70	0.13			0.30			99.40	2.92
68 C4. V	46.36	14.87	n. d.	11.03	5.01	10.76	2.62	7.56	0.50			0.67			99.42	2.78
69 D4. V	46.25	14.93	n. d.	10.69	6.56	11.77	3.33	5.35	0.02			0.57			99.47	2.86

LEUCITE TEPHRITE, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
52	Casale Caffarella, Alban Hills, Italy.	Trottarelli.	A. Verri, B. Soc. G. It., XII, p. 54, 1893.	Leucitite tuff.	In W. T., p. 463.
53	Alban Hills, Italy.	Trottarelli.	A. Verri, B. Soc. G. It., XII, p. 60, 1893.	Leucitite tuff.	In W. T., p. 463.
54	Rocca di Papa, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. C. G. It., X, p. 163, 1900.	Leucitite.	In W. T., p. 463.
55	Rocca di Papa, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. C. G. It., X, p. 163, 1900.	"Sperone" (altered leucitite).	In W. T., p. 463.
56	Rocca di Papa, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. C. G. It., X, p. 163, 1900.	"Sperone" (altered leucitite).	In W. T., p. 463.
57	Rocca di Papa, Alban Hills, Italy.	G. Aichino.	V. Sabatini, Mem. C. G. It., X, p. 163, 1900.	Leucitite.	In W. T., p. 463.
58	Cava di San Paolo, Alban Hills, Italy.	Trottarelli.	A. Verri, B. Soc. G. It., XII, p. 53, 1893.	Leucitite tuff.	In W. T., p. 463.
59	Catacomb of St. Sebastian, Rome, Italy.	G. H. Miller.	N. Knight, School of Sci. and Math., XIII, p. 666, 1913.	Tuff.	
60	Lunghezza, near Rome, Italy.	A. Rosati.	A. Rosati, B. Soc. G. It., XXX, p. 28, 1911.	Leucitite.	Alkalies by difference. Other analyses in same paper.
61	Morolo, Hernican District, South of Rome, Italy.	C. Viola.	C. Viola, N. J., I, p. 97, 1899.	Leucite basalt.	In W. T., p. 301.
62	Morolo, Hernican District, South of Rome, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucite basalt.	
63	Ticchiena, Hernican District, South of Rome, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucite tephrite.	Cf. No. 3, III.8.2.2.
64	Sant' Arcangelo, near Ceccano, Hernican District, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucite basalt.	
65	Anticoli di Campagna, Hernican District, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucitite.	
66	Pofi, Hernican District, South of Rome, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucite tephrite.	Cf. No. 4, III.8.2.2.
67	San Francesco, near Ceccano, Hernican District, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucite basanite.	
68	Callame, near Ceccano, Hernican District, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucitite.	
69	Villa San Stefano, Hernican District, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucite basalt.	

LEUCITE TEPHRITE, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
70 D4. V	46.14	12.60	n. d.	9.80	3.82	11.71	7.87	6.62	0.28			0.37			99.10	2.79
71 D4. V	45.55	17.04	n. d.	12.02	6.62	7.53	2.06	6.56	0.52			0.74			98.64	2.86
72 D3. V	47.40	19.84	2.72	4.40	4.23	9.88	2.93	5.91	1.66		0.30				99.27	
73 C4. V	59.92	18.09	4.52	n. d.	0.44	2.19	6.23	7.24	1.17						99.80	
74 D4. V	48.83	20.07	7.97	n. d.	1.14	11.85	3.32	7.04	n. d.			1.24	0.50		101.93	
75 B3. IV	48.15	18.44	7.57	2.75	4.43	8.24	2.87	5.83	—			0.74	0.39	BaO 0.10 SrO 0.03	99.55	
76 B3. IV	48.12	19.08	7.71	2.77	3.73	7.95	2.53	6.40	—			0.85	0.42	BaO 0.09 SrO 0.03	99.68	
77 D3. V	47.85	16.82	12.00	n. d.	2.65	7.23	2.53	7.19	—		0.20	0.66	0.48	SO ₃ 1.13 Cl 0.19 NH ₃ 0.01	98.94 (98.48)	
78 D4. V	47.79	20.47	8.60	n. d.	4.67	10.90	1.82	5.20				0.38	0.49		100.47	
79 D4. V	47.16	20.38	9.92	n. d.	2.83	10.25	2.30	6.91	0.20			0.34	0.33		100.62	
80 C4. V	47.25	18.17	9.23	n. d.	3.74	8.65	3.93	7.15	0.94		trace				99.06	2.723
81 D2. V	43.69	16.75	12.29	2.72	2.30	11.97	4.63	4.66	n. d.		0.17		0.30	SO ₃ 0.93 Cl 0.60 SO ₂ 0.02 NH ₃ 0.03 NO ₂ trace CuO 0.08	101.14	
82 D4. V	41.74	17.71	25.34	n. d.	0.21	5.31	1.92	0.10	3.72			1.43		SO ₃ 1.52 Cl 0.24 NH ₃ trace	99.24	
83 D4. V	51.38	26.35			6.03	9.09	4.76	3.33							100.93	
84 B4. V	47.13	14.47	13.56	n. d.	4.16	9.00	0.81	8.00	2.94						100.07	
85 D4. V	47.31	18.51	14.56	n. d.	2.28	7.57	0.98	6.14	2.31			0.55			100.21	2.910
86 D4. V	46.43	15.99	15.04	n. d.	1.74	9.27	0.51	6.93	3.20			0.73			99.84	2.890

HAUYNOPHYRE, ETC.

1 D4. V	54.00	24.10	8.95	n. d.	2.35	4.65	5.60	1.58	n. d.					SO ₃ n. d.	101.23	
2 D4. V	53.60	22.57	6.78	n. d.	3.92	5.80	5.11	4.01	n. d.					SO ₃ trace	101.79	

LEUCITE TEPHRITE, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
70	Patrica, Hernican District, South of Rome, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucitite.	
71	Giuliano di Roma, Hernican District, Italy.	G. Aichino.	C. Viola, B. C. G. It., XXXIII, p. 120, 1902.	Leucite basalt.	
72	Orchi, Rocca Monfina Volcano, Italy.	A. Röhrig.	H. S. Washington, J. G., V, p. 247, 1897.	Leucite tephrite.	Cf. No. 4, II.5.3.2. In W. T., p. 305.
73	Lava of 1822, Mount Vesuvius.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 475, 1887.	Obsidian.	In W. T., p. 465.
74	Lava of 1906, Mount Vesuvius.	S. Stoklassa.	L. v. Szatmary, F. K., XXXVII, p. 182, 1907.	Leucite tephrite.	
75	Ashes of 1906, Mount Vesuvius.	Casoria.	H. J. Johnston-Lavis, Tr. R. Dub. Soc., IX, p. 166, 1909.	(Leucite tephrite).	3 decimals.
76	Ashes of 1906, Mount Vesuvius.	Casoria.	H. J. Johnston-Lavis, Tr. R. Dub. Soc., IX, p. 166, 1909.	(Leucite tephrite).	3 decimals.
77	Ashes of 1906, Mount Vesuvius.	G. Kernot.	G. Kernot, Rend. Ac. Sci. Nap. (3), XII, p. 461, 1906.	(Leucite tephrite).	4 decimals. Other analyses in same paper.
78	Lava of 1906, Mount Vesuvius.	F. Heurich.	F. Heurich, Sb. Ph. Ges. Erl., XLIII, p. 205, 1912.	Leucite tephrite.	Interior of flow.
79	Lava of 1906, Mount Vesuvius.	F. Heurich.	F. Heurich, Sb. Ph. Ges. Erl., XLIII, p. 205, 1912.	Leucite tephrite.	Surface of flow.
80	Mount Vesuvius.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 486, 1887.	Leucite tephrite.	In W. T., p. 465.
81	Ashes of 1906, Mount Vesuvius.	Comanducci and Pescitelli.	Comanducci and Pescitelli, Rend. Ac. Sc. Nap. (3), XII, p. 278, 1906.	(Leucite tephrite).	3 decimals.
82	Ashes of 1904, Mount Vesuvius.	Comanducci and Pescitelli.	Comanducci and Pescitelli, Rend. Ac. Sc. Nap. (3), XI, p. 253, 1905.	(Leucite tephrite).	3 decimals. Cf. No. 15, II.6.2.3.
83	Volcanello, Vulcano, Æolian Islands.	H. Bäckström.	H. Bäckström, G. F. F., XVIII, p. 159, 1896.	Leucite basanite.	In W. T., p. 465.
84	Pangkadjene, Celebes.	W. Bruhns.	H. Bücking, Ber. Nf. Ges. Freib., XI, p. 83, 1900.	Leucite basalt.	In W. T., p. 465.
85	El Capitan, Canbeligo County, New South Wales.	J. C. H. Mingaye.	David and Anderson, Rec. G. S. N. S. W., I, p. 156, 1890.	Leucite basalt.	Cf. No. 11, IV.2.2.2.2. In W. T., p. 465.
86	By rock, New South Wales.	J. C. H. Mingaye.	David and Anderson, Rec. G. S. N. S. W., I, p. 156, 1890.	Leucite basalt.	In W. T., p. 465. Cf. No. 2, III.8.1.2.

HAÜYNOPHYRE, ETC.

1	Aiguille de Guery, Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXXVIII, p. 1097, 1899.	Haüyne tephrite.	In W. T., p. 465.
2	La Quenille, Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXVIII, p. 1097, 1899.	Haüyne tephrite.	In W. T., p. 465.

HAUYNOPHYRE, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
3 D4. V	53.20	24.16	7.07	n. d.	2.20	6.38	4.44	3.21	n. d.					SO ₂ 0.50	100.16	
4 D4. V	53.00	22.63	7.50	n. d.	2.47	7.14	1.72	5.89	n. d.					SO ₂ 0.25	100.60	
5 D4. V	52.80	21.95	10.96	n. d.	3.06	7.05	4.37	2.39	n. d.					SO ₂ n. d.	102.58	
6 D4. V	54.48	21.67	1.21	2.77	1.44	5.05	7.43	4.65	2.66		0.38	trace		SO ₂ 0.21 Cl 0.07	102.02	
7 B3. IV	49.06	16.07	7.92	2.41	2.65	8.21	5.17	3.18	2.27		0.81	0.61	0.98	CO ₂ 1.21 SO ₂ trace Cl trace	100.55	2.631
8 C4. V	55.02	21.81	2.40	0.75	0.73	3.08	2.79	5.61	7.63			0.19		Cl n. d.	100.01	
9 C3. V	51.84	18.96	6.25	3.55	1.34	5.07	3.00	3.21	4.85		0.43		0.43	SO ₂ n. d.	98.93	2.637
10 C4. V	50.35	21.50	5.97	trace	0.15	4.51	7.79	5.68	3.64				0.42	CO ₂ 0.52 SO ₂ n. d.	100.53	2.567
11 D3. V	50.80	20.41	3.13	5.36	2.48	6.40	3.44	2.95	2.67		0.15	trace	0.70	Cl 0.08	98.57	
12 D3. V	47.71	9.37	5.31	9.53	7.06	15.13	2.21	1.01	0.41			trace	0.81	SO ₂ 2.12	100.67	2.992
13 D3. V	46.72	19.50	3.03	5.02	4.41	16.28	2.09	1.24	1.13			0.73	0.37	SO ₂ n. d.	100.52	3.012
14 D3. V	45.37	14.11	5.06	7.08	7.56	17.11	1.34	0.62	0.65			0.28	0.26	SO ₂ 1.30	100.74	2.574
15 D3. V	42.78	11.07	17.07	5.51	4.23	12.57	1.11	0.72	4.02			0.31	0.42	SO ₂ 0.52	100.33	
16 D3. V	42.63	18.91	5.06	9.16	3.60	12.11	2.66	1.35	2.12			0.34	0.36	SO ₂ 2.07	100.37	2.538
17 D3. V	42.16	16.25	3.02	9.03	3.11	10.05	2.13	7.06	2.13			0.26	0.72	SO ₂ 4.11	100.03	2.615
18 D3. V	39.74	10.27	6.07	13.11	4.18	19.11	3.12	0.63	0.50			0.41	0.63	SO ₂ 3.26	101.03	2.630
19 D3. V	41.77	14.05	4.21	11.03	3.40	12.52	6.23	1.38	1.80			trace	1.23	SO ₂ 2.65	100.27	
20 D3. V	36.35	12.37	5.26	11.71	7.46	16.82	2.07	1.38	4.11			0.63	0.42	SO ₂ 2.12	100.80	2.840
21 D3. V	47.29	15.46	12.00	2.35	1.32	1.61	14.74	1.23	1.85				trace	SO ₂ n. d. Cl n. d. S trace	97.87	
22 D3. V	58.9	18.8	2.2	1.8	3.2	2.7	6.6	3.5	2.7		1.0			SO ₂ 0.22 Cl 0.15	101.77	2.44

HAUYNOPHYRE, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
3	Roc Blanc, Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1889.	Hauyne tephrite.	In W. T., p. 465.
4	Roc Blanc? Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Hauyne tephrite.	In W. T., p. 465.
5	Roc Blanc? Mont Dore, Auvergne.	E. Bonjean.	E. Bonjean, C. R., CXXVIII, p. 1097, 1899.	Hauyne tephrite.	In W. T., p. 465.
6	Hohenstein, Bohemia.	R. Pfohl.	J. E. Hibs., T. M. P. M., XIX, p. 82, 1900.	Sodalite tephrite.	In W. T., p. 465.
7	Grosspriesen, Bohemia.	F. Hanusch.	J. E. Hibs., T. M. P. M., XXI, p. 160, 1902.	Sodalite syenite.	Not fresh. MnO high.
8	Boschnei, Mittelgebirge, Bohemia.	C. F. Eichleiter.	G. Irgang, T. M. P. M., XXVIII, p. 67, 1909.	Sodalite gauteite.	Not fresh.
9	Spitzberg, Melnik, Mittelgebirge, Bohemia.	J. Hanusch.	B. Zahalka, Sb. Böhm. Ges. W., Art. III, p. 57, 1905.	Hauyne trachyte.	
10	Vratislav, Mittelgebirge, Bohemia.	E. Kohn.	B. Zahalka, Sb. Böhm. Ges. W., Art. III, p. 57, 1905.	Hauyne trachyte.	
11	Pihlberg, Polzen District, Bohemia.	Donath.	K. H. Scheumann, Abh. Sächs. Ges. W., XXXII, p. 757, 1913.	Sodalite trachyte.	
12	Monte Vulture, Apulia, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVII, p. (5), 1887.	Lava (hauynophyre?).	In W. T., p. 465.
13	Monte Vulture, Apulia, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVII, p. (5), 1887.	Lava (hauynophyre?).	In W. T., p. 465.
14	Monte Vulture, Apulia, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVII, p. (6), 1887.	Lava (hauynophyre).	In W. T., p. 465.
15	Monte Vulture, Apulia, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVII, p. (7), 1887.	"Oolitic rock" (hauynophyre?).	In W. T., p. 465.
16	Melfi, Monte Vulture, Apulia, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVII, p. (10), 1887.	Hauynophyre.	Cf. No. 2, II.8.2.4. In W. T., p. 465.
17	Melfi, Monte Vulture, Apulia, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVII, p. (9), 1887.	Hauynophyre.	Cf. No. 2, II.8.2.4. In W. T., p. 465.
18	Melfi, Monte Vulture, Apulia, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVII, p. (9), 1887.	Hauynophyre.	Cf. No. 2, II.8.2.4. In W. T., p. 467.
19	Monte Vulture, Apulia, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVII, p. (8), 1887.	Hauynophyre tuff.	In W. T., p. 467.
20	Monte Vulture, Apulia, Italy.	L. Ricciardi.	L. Ricciardi, Gaz. Chim. It., XVII, p. (6), 1887.	Lava (hauynophyre?).	In W. T., p. 467.
21	Tavajokthal, Lujavurt, Kola, Finland.	H. Blankett.	W. Ramsay, Fennia, XV, No. 2, p. 25, 1899.	Tavite.	Not in W. T.
22	Senoudebou, French Sudan.	H. Arsandaux.	H. Arsandaux, C. R., CXXXVIII, p. 164, 1904.	Nosean trachyte.	

IJOLITE, ETC.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O-	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
1 D4. V	45.18	23.31	6.11	n. d.	1.45	4.62	11.17	5.95	1.14						98.93	
2 D3. V	46.63	15.03	5.91	5.09	3.47	11.23	8.16	1.96	0.35		1.12		trace		98.95	
3 D3. V	42.79	19.89	4.39	2.33	1.87	11.76	9.31	1.67	0.99		1.70	1.70	0.41		98.81	

LIMBURGITE.

1 B3. IV	42.55	14.10	4.10	7.10	10.80	11.20	3.05	1.86	2.00		4.47				101.23	
2 C4. V	42.30	12.74	10.60	n. d.	12.74	13.01	2.65	0.94	2.54		1.51				99.03	
3 D4. V	44.47	10.97	n. d.	13.08	6.24	12.66	4.58	1.68	(2.27)		3.56		trace	CO ₂ none	99.43	
4 C4. V	43.33	11.06	n. d.	15.25	6.24	12.66	4.58	1.68	1.43		4.63		trace	CO ₂ none	100.86	
5 C4. V	42.61	11.55	n. d.	12.27	12.10	13.43	1.06	2.80	n. d.		4.33				100.15	
6 C4. V	40.48	8.93	20.05	n. d.	11.12	13.03	2.05	1.26	3.37						100.29	2.931
7 C2. IV	43.18	13.43	5.06	6.41	11.79	10.39	3.05	1.41	2.36		2.16	0.38		CO ₂ 0.43 X 0.80 Cl 0.23	101.08	3.021
8 D4. V	43.47	22.00	3.47	7.79	3.40	14.08	2.98	0.91	0.94		1.79	0.91			101.74	
9 D2. IV	42.21	17.45	5.90	6.60	11.00	12.60	1.12	0.87	0.98		1.90	0.93			101.56	
10 D4. V	43.21	13.22	5.74	7.34	13.03	9.82	1.61	n. d.	2.47	0.76	2.15				102.23	
11 D2. IV	42.32	12.11	4.97	6.13	15.21	9.78	2.66	1.92	2.17		2.17	0.26	0.14	CO ₂ 0.62 X 0.94 SO ₂ trace Cl 0.16	101.56	3.069
12 C4. V	39.07	13.70	20.92	n. d.	6.90	10.04	2.68		3.53		0.21	0.52	0.55	CO ₂ 2.46 SO ₂ 0.18 Cl 0.13	100.89	
13 B4. IV	44.71	21.05	6.54	5.74	4.69	10.50	2.24	1.19	2.25		0.92				99.83	
14 B4. V	41.00	10.41	11.42	7.44	In FeO	8.07	11.66	2.86	0.41	0.20	2.57	3.76			99.80	

IJOLITE, ETC.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
1	Beemerville, Sussex County, New Jersey.	F. W. Love?	J. F. Kemp, Tr. N. Y. Ac. Sc., XI, p. 67, 1892.	Sussexite.	In W. T., p. 467.
2	Kalajokthol, Kola, Finland.	H. Berghell.	V. Hackman, Fennia, XI, No. 2, p. 185, 1894.	Ijolite.	In W. T., p. 467.
3	Iiwaara, Kola, Finland.	H. Berghell.	Ramsay and Berghell, G. F. F., XIII, p. 302, 1891.	Ijolite.	In W. T., p. 467.

LIMBURGITE.

1	Chateau du Perroux, Ardoisiere, France.	Pisani.	A. Michel-Levy, C. R., CXLVIII, p. 1530, 1909.	Limburgite.	
2	Reichenweiler, Vogesen, Elsass.	G. Linck.	G. Linck, Mt. C. G. L.-U. Els., I, p. 60, 1887.	Limburgite.	In W. T., p. 469.
3	Wesenweiler, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 283, 1892.	Limburgite.	Figs. for MgO, CaO, Na ₂ O, K ₂ O sic. Cf. next below. In W. T., p. 469.
4	Eichelspitze, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 281, 1892.	Limburgite.	Figs. for MgO, CaO, Na ₂ O, K ₂ O sic. Cf. next above. In W. T., p. 469.
5	Limburg, Kaiserstuhl, Baden.	A. Knop.	A. Knop, D. Kaiserst., p. 296, 1892.	Limburgite.	Ignited before analysis. H ₂ O=2.11. In W. T., p. 469.
6	Kaiserstuhl, Baden.	A. Lagorio.	A. Lagorio, T. M. P. M., VIII, p. 479, 1887.	Limburgite.	In W. T., p. 469.
7	Ulmenstein, Rhöngebirge.	E. Möller.	E. Möller, N. J., I, p. 112, 1888.	Limburgite.	In W. T., p. 345.
8	Heiligenberg, Hesse.	C. Trenzen.	C. Trenzen, N. J., II, p. 32, 1902.	Limburgite.	
9	Stellberg, Homburg, Hesse.	C. Trenzen.	C. Trenzen, N. J., II, p. 25, 1902.	Limburgite.	
10	Neuhof, near Giessen, Hesse.	A. Streng.	W. Schottler, Abh. G. L.-A. Darm., IV (3), p. 452, 1908.	Limburgite.	
11	Schaumburg, near Cassel, Hesse-Nassau.	O. Fromm.	O. Fromm, Z. D. G. G., XLIII, p. 68, 1891.	Limburgite.	In W. T., p. 345.
12	Vinice, Bohemia.	F. Kovar.	K. Hinterlechner, Jb. G. R.-A. Wien, L, p. 512, 1901.	Limburgite.	Not fresh. In W. T., p. 469.
13	Dioshegy, Balaton Lake, Hungary.	L. Tomasowsky.	J. Vitalis, Balat. Sees, I (1), No. 2, p. 89, 1911.	Limburgite.	
14	Ambohimahala, Itasy, Madagascar.	Not stated.	A. Lacroix, C. R., CLVI, p. 179, 1913.	Limburgitic basalt.	Cf. No. 5, IJ.7.1.4.

LIMBURGITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
15 C2. IV	42.72	16.46	5.74	5.53	6.27	11.20	2.94	0.66	3.23		3.10	0.91	0.26		99.02 (101.02)	
16 D4. V	53.92	17.98	n. d.	4.88	4.57	7.59	3.92	1.14	4.64						98.64	
17 C3. V	39.32	17.53	3.07	9.12	8.00	10.38	2.44	2.04	5.10	2.20					99.20	

MELLILITE ROCKS.

1 C4. V	33.89	9.93	15.63	n. d.	16.14	15.19	2.86	n. d.	2.90		0.64	1.41	trace	CO ₂ 1.41 S trace Cr ₂ O ₃ trace	100.00	
2 C3. V	39.63	6.59	13.79	3.53	10.46	14.25	6.62	trace	—		4.21	0.92			100.00	
3 C3. V	37.51	6.84	12.74	5.64	12.49	11.39	5.69	trace	—		7.70				100.00	
4 C4. V	43.36	9.37	8.88	n. d.	10.42	15.38	1.49	3.21	6.66			trace			98.77	

PYROXENITE, ETC.

1 C3. V	48.05	16.17	3.44	7.47	8.15	10.85	1.51	0.92	1.21	0.07	1.67	none		CO ₂ none ZrO ₂ none	99.51 (100.06)	
2 D4. V	43.35	29.75	5.61	n. d.	2.03	12.46	trace	5.93	0.73						99.86	
3 D3. V	50.71	18.75	7.85	n. d.	3.78	9.78	4.86	2.42	1.13	0.06			0.25		99.59	
4 B4. V	51.64	0.12	n. d.	9.28	31.93	0.45	n. d.	n. d.	5.45				0.56		99.43	
5 C3. V	43.65	6.81	15.94	5.14	12.91	4.86	0.43	0.52	7.46					CO ₂ 1.12	98.84	
6 B4. V	54.12	7.91	n. d.	12.87	16.64	6.21	0.44	1.19	n. d.						99.38	3.30
7 C4. V	46.35	16.41	n. d.	9.91	18.72	6.14	n. d.	n. d.	3.01						100.54	3.21
8 D3. V	44.20	27.37	2.71	6.58	2.78	11.83	2.88		1.08				trace		99.43	
9 C2. IV	38.80	12.50	6.57	8.20	13.10	11.42	1.60	0.81	2.85		1.60	1.26	0.23		98.94	3.16

LIMBURGITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
15	Mindello, Sao Vicente, Cape Verde Islands.	C. v. John.	C. v. John, Jb. G. R.-A. Wien, XLVI, p. 286, 1896.	Limburgite.	Cf. No. 136, III. 5.4.4-5, In W. T., p. 337.
16	Chichishima, Bonin Islands, Japan.	J. Petersen.	J. Petersen, Jb. Hamb. W. Anst., VIII, p. 30, 1891.	Boninite (bronzite limburgite).	In W. T., p. 469.
17	Bendigo, Victoria.	F. Stone.	A. W. Howitt, Vict. Dep. Min., Spec. Rep., p. 4, 1893.	Limburgite.	In W. T., p. 469.

MELILITE ROCKS.

1	Hochbowl, near Owen, Wurttemberg.	J. Meyer.	A. Stelzner, N. J. B. B., II, p. 398, 1883.	Melilite basalt.	Calculated from sol. and insol. In W. T., p. 467.
2	Kimmelsbach, Hassgau, Thuringia.	A. Ostermayer.	A. Ostermayer, In. Diss. Erl., p. 40, 1903.	Melilite basalt.	Calculated to 100, water free. 3 decimals.
3	Schwanhausen, Hassgau, Thuringia.	A. Ostermayer.	A. Ostermayer, In. Diss. Erl., p. 40, 1903.	Melilite basalt.	Calculated to 100, water free. 3 decimals.
4	Coppaeli, Monte Terminillo, near Rieti, Umbria.	L. Brugnatelli.	L. Brugnatelli, B. C. G. It., XIV, p. 318, 1883.	Melilite pyroxene rock.	Coppaelite in V. Sabatini, B. C. G. It., XXXIV, p. 378, 1903. In W. T., p. 467.

PYROXENITE, ETC.

1	Preston, Connecticut.	G. F. Loughlin.	G. F. Loughlin, U. S. G. S. B. 492, p. 114, 1912.	Amphibolite.	Intruded.
2	Rosetown, near Stony Point, New York.	J. F. Kemp?	J. F. Kemp, A. J. S., XXXVI, p. 250, 1888.	Hornblende- augite rock.	In W. T., p. 469.
3	Follensby Pond, Adirondack Mountains, New York.	Students.	H. P. Cushing, N. Y. St. Mus. A. R., LX (2), p. 527, 1907.	Pyroxenic amphibolite.	Igneous?
4	Corundum Hill, Macon County, North Carolina.	C. Baskerville.	Pratt and Lewis, Rep. N. C. G. S., I p. 90, 1905.	Enstatolite.	
5	Morton, Minnesota River, Minnesota.	A. D. Meeds.	C. W. Hall, U. S. G. S. B. 157, p. 113, 1899.	Saxonite.	In W. T., p. 471.
6	Jackass Creek, Montana.	G. P. Merrill.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 662, 1895.	Websterite.	In W. T., p. 469.
7	Meadow Creeks, Montana.	G. P. Merrill.	G. P. Merrill, Pr. U. S. Nat. Mus., XVII, p. 656, 1895.	Saxonite.	In W. T., p. 471.
8	Bute Inlet, Queen Charlotte Sound, British Columbia.	R. P. D. Graham.	J. A. Bancroft, Can. G. S. Mem. 23, p. 87, 1913.	Hornblendite.	
9	Prospect Lake, Vancouver, British Columbia.	M. F. Connor.	C. H. Clapp, Can. G. S. Mem. 36, p. 69, 1913.	Hornblendite.	

PYROXENITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
10 B4, V	49.68	12.07	10.57	n. d.	9.02	13.85	3.31	1.15	0.56				trace		100.21	
11 B3, IV	46.0	10.9	1.7	9.3	15.2	13.1	1.5	0.3	2.0						100.0	
12 D3, V	44.90	17.25	1.71	4.30	20.41	10.89	1.22	0.56	0.33						101.57	
13 C3, V	52.01	1.65	1.23	22.70	1.65	19.15	1.25	1.08	n. d.			0.41		S 0.08	101.21	
14 B3, IV	49.13	11.23	1.41	6.54	14.15	10.99	2.07	0.27	2.35	0.29			0.77		99.20	3.10
15 C3, V	37.17	21.79	9.04	2.84	4.42	14.79	2.85	3.25	3.67		0.72		0.46		101.00	2.974
16 D4, V	40.70	20.80	13.40	n. d.	6.00	8.15	5.25		6.40			0.65			101.35	2.94
17 C3, V	41.97	16.60	3.28	11.22	7.02	12.65	2.55	1.18	2.60		1.06				101.13	
18 D2, V	49.34	3.53	0.91	6.91	18.83	20.15	0.17	0.09	0.58		1.04		0.03		101.58	
19 B4, V	49.15	1.65	1.58	4.19	20.60	20.36	n. d.	n. d.	0.85					Cr ₂ O ₃ 0.70	99.08	
20 B3, IV	44.17	11.24	9.97	6.22	6.55	11.77	3.04	1.97	2.31		2.83				99.07	
21 D4, V	46.86	9.80	16.35	n. d.	18.08	9.57	trace	trace	0.67						101.33	3.333
22 C2, IV	45.98	20.60	2.42	7.50	10.43	7.44	2.07	1.68	1.02	0.14	0.50	0.20	0.33		100.23	
23 B3, IV	41.46	20.36	3.37	16.71	5.50	8.79	2.43	0.82	n. d.	0.13				S Cu 0.13 0.44	100.70	3.05

PERIDOTITE.

1 C3, V	42.63	6.88	3.33	7.27	29.36	5.90	1.26	0.14	n. d.				0.36	Cr ₂ O ₃ 0.05 NiO 0.27	97.45	
2 D4, V	20.85	5.55	45.62		16.45	0.73	n. d.	n. d.	n. d.		9.93	trace		S trace	99.69	
3 C3, V	47.41	6.39	7.06	4.80	15.34	14.32	(0.69)	1.40	2.10					S 0.49	100.00	3.30
4 D4, V	37.44	28.60	11.92	n. d.	1.97	5.45	0.97	1.02	12.67					Cr ₂ O ₃ none	100.04	
5 D4, V	33.80	6.84	12.26	n. d.	21.38	9.50	n. d.	n. d.	15.20						98.98	2.732

PYROXENITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
10	Mount Waterman, San Gabriel Mountains, California.	A. M. Strong.	Arnold and Strong, B. G. S. A., XVI, p. 197, 1905.	Hornblendite.	
11	Col d'Eret, Pyrenees.	H. Arsandaux.	A. Lacroix, Cong. G. Int., VIII, C. R., p. 833, 1901.	Hornblendite.	Not in W. T.
12	Tuc d'Ess, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int., VIII, C. R., p. 833, 1901.	Ariegite.	In W. T., p. 335.
13	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlechner and v. John, Jb. G. R.-A. Wien., LIX (1), p. 216, 1909.	Pyroxenite.	
14	Halire Forest, Eule, Bohemia.	H. L. Barvir?	H. L. Barvir, Ref. N. J., I, p. 49, 1904.	Porphyritic hornblende rock.	
15	Zitúé, Mittelgebirge, Bohemia.	J. Hanasch.	B. Zabalka, Sb. Böhm. Ges. W., Art. III, p. 57, 1905.	Camptonitic augitite.	
16	Giumarra, near Rammacca, Sicily.	C. Viola.	C. Viola, B. C. G. It., XXXII, p. 305, 1901.	Giumarrite (augitite).	
17	Tswetli-bor, Iss River, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 366, 1910.	Issite (feldspathic hornblendite).	Also in C. R., CLI, p. 1137, 1910.
18	Sokolky, Kamenouchky, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 354, 1910.	Pyroxenite.	
19	Tilai Mountains, Iow District, Ural Mountains.	Not stated.	Duparc and Pearce, Ourala Nord., II, p. 417, 1905.	Pyroxenite.	
20	Mokvaja Wolnowacha, Mariupol, Russia.	J. Morozewicz.	J. Morozewicz, Ref., N. J., I, p. 394, 1900.	Augitite.	Schlieren in basalt. In W. T., p. 315.
21	Pallavaram, Madras, India.	T. L. Walker.	T. H. Holland, Mem. G. S. Ind., XXVIII, p. 166, 1900.	Hypersthénite.	In W. T., p. 469.
22	Anabar River, Siberia.	H. Backlund.	H. Backlund, Trav. Mus. G. St. P., I, p. 158, 1907.	Pyroxenite.	
23	Consols mine, Broken Hill, New South Wales.	H. P. White.	J. B. Jaquet, Mem. G. S. N.-S. W. No. 5, p. 56, 1894.	Bronzite amphibolite.	Not in W. T.

PERIDOTITE.

1	Kaersut, Nugsuaks Peninsula, Greenland.	W. C. Phalen.	W. C. Phalen, Smiths. Misc. Coll., XLV, p. 211, 1904.	Peridotite.	"Incomplete analysis."
2	Iron Mine Hill, Cumberland, Rhode Island.	T. Drown.	M. E. Wadsworth, Lithol. Stud., p. XVI, 1884.	Cumberlandite.	In W. T., p. 469. Cf. No. 1, V.3.5.1.3.
3	Montrose Point, near Peekskill, New York.	W. H. Emerson.	G. H. Williams, A. J. S., XXXI, p. 40, 1886.	Augite peridotite.	Na ₂ O by difference. In W. T., p. 359.
4	Ithaca, New York.	W. H. Morrison.	J. F. Kemp, A. J. S., XLII, p. 412, 1891.	Peridotite.	Not fresh. In W. T., p. 469.
5	Manheim, Herkimer County, New York.	C. W. Smith.	C. H. Smyth, A. J. S., XLIII, p. 325, 1892.	Peridotite.	Not fresh. In W. T., p. 469.

PERIDOTITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
6 D3, V	41.00	7.58	5.99	4.63	23.59	10.08	0.52	n. d.	4.73				trace	CO ₂ 3.62	101.74	2.989
7 C4, V	44.61	14.28	n. d.	14.59	15.68	2.56	0.97	0.27	7.17		trace		trace		100.13	
8 C4, V	38.72	16.06	n. d.	11.24	19.01	5.37	5.25	0.34	3.16		trace		0.24		99.39	
9 C4, V	38.52	1.60	n. d.	11.24	37.55	1.23	3.61	2.37	3.30		none		0.28		99.70	
10 A4, IV	42.71	0.70	n. d.	6.83	n. d.	n. d.	n. d.	8.38					0.09	Cr ₂ O ₃ trace NiO 0.32	100.21	3.10
11 C4, V	47.41	16.03	2.66	7.05	5.81	12.33	4.47		2.19		1.29		trace		99.24	2.96
12 B4, V	41.49	2.22	1.07	7.11	39.63	1.89	n. d.	n. d.	5.56						98.97	
13 C3, V	46.0	6.8	3.0	7.5	23.9	8.1	0.8	0.9	2.4					Cr ₂ O ₃ 0.2	99.6	3.15
14 C3, V	38.6	3.7	7.6	7.8	27.7	7.7	none	0.2	6.4					Cr ₂ O ₃ 0.1	99.8	3.00
15 A4, V	44.06	12.16	4.85	5.48	18.21	9.80	0.98		3.80						79.34	
16 D4, V	42.10	3.28	8.27	2.13	30.65	3.77	1.90		7.73				0.70		100.53	2.82
17 D4, V	37.8	9.7	3.4	7.0	22.9	4.1	0.8	trace	14.0						99.7	
18 C3, V	43.39	9.09	9.31	7.25	16.80	9.22	0.04	trace	3.45	0.14	trace		trace	CO ₂ 0.09 S 0.56 Cr ₂ O ₃ trace NiO trace	99.34	
19 C4, V	49.10	8.48	5.79	n. d.	20.85	12.90	1.67	0.56	0.23				trace	Cr ₂ O ₃ 0.57	100.15	
20 B3, IV	44.64	5.85	2.85	4.50	38.76	2.47	n. d.	n. d.	0.30					Cr ₂ O ₃ 0.20	99.57	
21 C3, V	43.70	11.20	3.90	6.15	25.60	7.07	0.52	0.31	2.80						101.25	
22 B4, V	43.25	3.25	9.15	n. d.	38.10	2.70	0.45	0.15	2.55						99.60	
23 B3, IV	42.00	3.19	2.81	4.41	40.40	3.30	1.20	0.29	1.66				trace	Spinel 1.90	101.16	
24 C3, V	40.24	5.38	6.61	6.49	31.05	4.10	0.39	0.21	6.80			0.06		S 0.04	101.37	
25 C3, V	37.16	10.06	7.53	6.69	28.04	1.84	0.66	0.42	8.70			0.06	trace	S 0.11	101.27	

PERIDOTITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
6	Pikesville, Baltimore County, Maryland.	L. McCay.	G. H. Williams, U. S. G. S. B. 28, p. 54, 1886.	Peridotite.	Not fresh. In W. T., p. 469.
7	Buck Creek, Clay County, North Carolina.	C. Baskerville.	Pratt and Lewis, N. C. G. S. Rep., I, p. 76, 1905.	Amphibole- peridotite.	
8	Buck Creek, Clay County, North Carolina.	C. Baskerville.	Pratt and Lewis, N. C. G. S. Rep., I, p. 78, 1905.	Troctolite.	
9	Buck Creek, Clay County, North Carolina.	C. Baskerville.	Pratt and Lewis, N. C. G. S. Rep., I, p. 75, 1905.	Dunite.	
10	Laurel Creek, Rabun County, Georgia.	W. H. Emerson.	F. P. Klug, Ga. G. S. B. 2, p. 81, 1894.	Dunite.	In W. T., p. 471.
11	The Potrero, San Francisco, California.	C. Palache.	C. Palache, B. Dep. G. Un. Cal., I, p. 177, 1894.	Lherzolite.	In W. T., p. 471.
12	Spanish Peak, Plumas County, California.	W. C. Blasdale.	A. C. Lawson, B. Dep. G. Un. Cal., III, p. 224, 1903.	Peridotite.	
13	Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 115, 1892.	Peridotite.	In W. T., p. 355.
14	Loch Garabal, Scotland.	J. H. Player.	Dakyns and Teall, Q. J. G. S., XLVIII, p. 145, 1892.	Olivine-diallage rock.	In W. T., p. 471.
15	Aodann Clach, Broadford, Skye, Scotland.	T. Baker.	A. Harker, Rocks of Skye, p. 382, 1904.	Dolerite picrite.	
16	Caithness, Scotland.	H. R. Mill.	J. W. Judd, Q. J. G. S., XLI, p. 402, 1885.	Scyelite.	Calculated from 3 poor partial analyses. In W. T., p. 471.
17	Firth of Forth, Scotland.	T. Waller.	J. W. Judd, Q. J. G. S., XLI, p. 400, 1885.	Picrite.	In W. T., p. 471.
18	Glendalough, County Wicklow, Ireland.	H. E. Clarke.	J. A. Thompson, Q. J. G. S., LXIV, p. 479, 1908.	Hornblende peridotite.	Norm and mode.
19	Tuc d'Ess, Pyrenees.	Stroesco.	A. Lacroix, N. Arch. Mus. (3), VI, p. 264, 1894.	Lherzolite.	In W. T., p. 471.
20	Lac Lherz, Pyrenees.	Pisani.	A. Lacroix, Cong. G. Int., VII, C. R., p. 833, 1901.	Lherzolite.	Not in W. T.
21	L'Etand de L'Estagnet, Pyrenees.	Pisani.	A. Lacroix, B. Sv. Ct. G. Fr., XI, No. 71, p. 31, 1900.	Peridotite.	In W. T., p. 355.
22	Freychinède, Pyrenees.	Not stated.	M. Longchambon, B. Sv. Ct. G. Fr., XXI, No. 131, p. 41, 1912.	Lherzolite.	
23	Prades, Pyrenees.	A. Brunet.	A. Lacroix, N. Arch. Mus. (3), VI, p. 264, 1894.	Lherzolite.	In W. T., p. 369.
24	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlacher and v. John, Jb. G. R.-A. Wien, LIX (1), p. 209, 1909.	Peridotite.	
25	Ransko, Eisengebirge, Bohemia.	C. v. John.	Hinterlacher and v. John, Jb. G. R.-A. Wien, LIX (1), p. 209, 1909.	Peridotite.	

PERIDOTITE—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp. gr.
26	40.81	1.09	1.98	5.02	37.09	1.32	n. d.	n. d.	10.26				0.64	Cr ₂ O ₃ 0.32	98.53	
D3. V																
27	49.35	2.68	n. d.	7.37	20.00	20.36	n. d.	n. d.	0.60						100.36	
C4. V																
28	44.94	4.84	4.64	6.75	23.16	14.70	n. d.	n. d.	1.44					Cr ₂ O ₃ 0.76	101.23	
C4. V																
29	43.30	4.89	6.20	11.66	16.68	19.70	n. d.	n. d.	0.15						102.58	
D4. V																
30	41.44	5.80	10.46	9.93	13.36	19.53	n. d.	n. d.	0.22				0.05	Cr ₂ O ₃ 0.57	101.36	
C4. V																
31	40.15	4.60	12.24	10.87	15.01	17.26	n. d.	n. d.	0.40					Cr ₂ O ₃ 0.58	101.11	
C4. V																
32	39.22	0.39	n. d.	16.41	43.81	1.20	n. d.	n. d.	0.32				trace	Cr ₂ O ₃ trace	101.35	
D4. V																
33	36.85	1.53	5.60	6.65	42.17	1.09	n. d.	n. d.	6.53					Cr ₂ O ₃ n. d.	100.42	
B4. V																
34	31.84	1.37	15.63	14.25	33.10	0.91	n. d.	n. d.	2.49				trace	Cr ₂ O ₃ n. d.	99.59	
B4. V																
35	35.41	1.33	4.43	3.66	44.05	n. d.	n. d.	n. d.	12.28						101.06	
C4. V																
36	44.20	2.57	7.46	9.00	17.54	18.69	0.21	0.16	1.05		0.63		0.08		101.59	
D3. V																
37	42.84	3.60	5.69	8.48	24.60	11.41	0.61	0.42	1.80				trace	Cr ₂ O ₃ 3.04	102.49	
D3. V																
38	36.92	8.55	17.46	8.02	11.87	18.20	n. d.	n. d.	0.15						101.17	
D4. V																
39	40.56	4.54	13.65	8.77	13.07	19.06	0.25	0.09	1.04		0.33		0.02		101.38	
D2. V																
40	38.76	11.93	5.57	7.01	26.03	6.91	0.53	0.07	3.86		0.11		0.53		101.31	
D3. V																
41	38.72	2.55	4.50	3.76	41.36	n. d.	0.57	n. d.	7.70						99.16	
B4. V																
42	38.00	1.33	3.05	4.46	41.92	n. d.	n. d.	n. d.	11.18				0.23	Cr ₂ O ₃ 0.21	100.38	
B4. V																
43	37.36	16.37	18.03	5.03	1.22	9.62	3.70	3.68	0.51		trace			CO ₂ 3.24	98.76	

PERIDOTITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
26	Kraubath, Styria.	H. Höfer.	K. A. Redlich, Cong. G. Int., IX, Guide IX, p. 3, 1903.	Peridotite.	
27	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 119, 1902.	Koswite.	
28	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 173, 1902.	Wehrite.	
29	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 119, 1902.	Koswite.	Not typical.
30	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 119, 1902.	Koswite.	Type.
31	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 119, 1902.	Koswite.	Type.
32	Koswinsky Kamen, Ural Mountains.	Jou Kowsky.	Duparc and Pearce, C. R., CXXXII, p. 894, 1901.	Dunite.	
33	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 163, 1902.	Dunite.	"Cr ₂ O ₃ in excess of Al ₂ O ₃ ."
34	Koswinsky Kamen, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 128, 1902.	Dunite.	
35	Sosnowsky Ouwal, Ural Mountains.	L. Duparc.	Duparc and Pearce, Oural Nord, I, p. 163, 1902.	Dunite.	"Cr ₂ O ₃ in excess of Al ₂ O ₃ ."
36	Tagil, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 351, 1910.	Koswite.	
37	Garewaia River, Tilai Mountains, Iow District, Ural Mountains.	Not stated.	Duparc and Pearce, C. R., CXXXIX, p. 155, 1904.	Garewaite.	Al ₂ O ₃ and Cr ₂ O ₃ inter- changed. Cf. Oural Nord, II, p. 490, 1905.
38	Tilai Mountains, Iow District, Ural Mountains.	Not stated.	Duparc and Pearce, Oural Nord, II, p. 423, 1905.	Koswite.	
39	Katch Kanar Mountain, Iss District, Ural Mountains.	Not stated.	Duparc and Pamfil, B. Soc. M. Fr., XXXIII, p. 351, 1910.	Koswite.	
40	Tschissopa Mountains, Ural Mountains.	F. Pearce.	Duparc and Pearce, C. R., CXLIV, p. 1290, 1907.	Troctolite.	
41	Solwa-Supreya, Ural Mountains.	Krikmeyer.	Loewinson-Lessing, G. Sk. Jusno. Saosk., p. 166, 1900.	Dunite.	In W. T., p. 473.
42	Antschung River, Ural Mountains.	Not stated.	Duparc and Wunder, C. R., CLIII, p. 884, 1911.	Harzburgite.	
43	Assuan, Egypt.	J. Szadeczky.	J. Szadeczky, F. K., XXIX, p. 210, 1899.	Josefite (olivine-augite rock).	Not in W. T.
44	De Beers mine, Kimberley, Griqualand.	H. E. Roscoe.	Cf. V. Hartog, Ec. G., IV, p. 450, 1909.	Kimberlite.	"Hardibank."

PERIDOTITE—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
45	De Beers mine, Kimberley, Griqualand.	L. de Launay.	Cf. V. Hartog, Ec. G., IV, p. 450, 1909.	Kimberlite.	"Hardibank."
46	De Beers mine, Kimberley, Griqualand.	L. de Launay.	Cf. V. Hartog, Ec. G., IV, p. 450, 1909.	Kimberlite.	"Hardibank."
47	De Beers mine, Kimberley, Griqualand.	H. E. Roscoe.	Cf. V. Hartog, Ec. G., IV, p. 450, 1909.	Kimberlite.	"Blue ground."
48	De Beers mine, Kimberley, Griqualand.	L. de Launay.	L. de Launay, C. R., CXXXV, p. 336, 1897.	Peridotite (kimberlite).	In W. T., p. 473.
49	De Beers mine, Kimberley, Griqualand.	N. S. Maskelyne.	Cf. V. Hartog, Ec. G., IV, p. 450, 1909.	Kimberlite.	"Blue ground."
50	Kimberley, Griqualand.	H. C. Lewis.	H. C. Lewis, Gen. of the Diam., p. 47, 1897.	Kimberlite.	In W. T., p. 473.
51	Kimberley, Griqualand.	H. C. Lewis.	H. C. Lewis, Gen. of the Diam., p. 47, 1897.	Kimberlite.	In W. T., p. 473.
52	Schuller mine, Pretoria, Transvaal.	Not stated.	H. S. Harger, Tr. G. Soc. S. Afr., VIII, p. 120, 1905.	Kimberlite.	
53	Hannans Lake, Kalgoorlie, Western Australia.	C. C. Williams.	E. S. Simpson, W. Aust. G. S. B. 6, p. 75, 1902.	Peridotite.	
54	Olivine Range, South Island, New Zealand.	T. Bateman.	G. H. F. Ulrich, Q. J. G. S., XLVI, p. 629, 1890.	Peridotite.	In W. T., p. 369.
55	Milford Sound, New Zealand.	P. Marshall.	P. Marshall, Tr. N. Z. Inst., VII, p. 483, 1905.	Harzburgite.	

IRON ORES, ETC.

1	Tucker Lake, Minnesota.	J. T. Singewald.	J. T. Singewald, U. S. Dep. Min. B. 64, p. 105, 1913.	Magnetite ore.	In gabbro. $MgO=MgCO_3$. $CaO=CaCO_3$.
2	Iron Lake, Minnesota.	J. A. Dodge.	N. H. and H. V. Winchell, Minn. G. S. B. VI, p. 641, 1891.	Iron ore.	$Fe_2O_3=Fe_3O_4$. Not in W. T.
3	Kawishiwi River, Minnesota.	C. F. Sidener.	H. V. Winchell, Minn. G. S. A. R., XVII, p. 80, 1889.	Iron ore.	Not in W. T.
4	Kawishiwi River, Minnesota.	C. F. Sidener.	H. V. Winchell, Minn. G. S. A. R., XVII, p. 97, 1889.	Iron ore.	Not in W. T.
5	Iron Lake, Minnesota.	C. F. Sidener.	H. V. Winchell, Minn. G. S. A. R., XVII, p. 81, 1889.	Iron ore.	$Fe_2O_3=Fe_3O_4$. Not in W. T.
6	Iron Mountain, Fremont County, Colorado.	School of Mines, Paris.	Cited in J. T. Singewald, U. S. Dep. Min. B. 64, p. 132, 1913.	Iron ore.	
7	Iron Mountain, Fremont County, Colorado.	School of Mines, Paris.	Cited in J. T. Singewald, U. S. Dep. Min. B. 64, p. 132, 1913.	Iron ore.	
8	Solnør, Skodje, Søndmøre, Norway.	O. N. Heiden- reich.	J. H. L. Vogt, Zs. Pr. G., VIII, p. 236, 1900.	Titanomagnetite spinelite.	Not in W. T.

IRON ORES, ETC.—Continued.

No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O+	H ₂ O—	TiO ₂	P ₂ O ₅	MnO	Inclusive.	Sum.	Sp.gr.
9 C4. V	n. d.	n. d.	29.00	27.00	4.07	2.00	n. d.	n. d.	n. d.		34.50	1.27		S 0.29	98.13	
10 C4. V	n. d.	n. d.	20.03	32.31	3.34	n. d.	n. d.	n. d.	n. d.		43.78				100.06	
11 C4. V	n. d.	n. d.	18.71	34.17	3.04	n. d.	n. d.	n. d.	n. d.		44.05				99.97	
12 B3. IV	5.33	0.61	4.83	82.28	0.50	3.84	n. d.	n. d.	n. d.		n. d.	2.52	0.16	S 0.06	99.56	
13 B3. IV	1.92	0.72	0.80	92.80	0.83	0.80	n. d.	n. d.	n. d.		1.34	0.01	0.23	V ₂ O ₅ 0.20 S 0.03	99.78	
14 B3. IV	1.88	1.39	4.91	90.19	0.72	0.60	n. d.	n. d.	n. d.		0.26	0.05	0.21	S 0.02 Cu trace	100.23	
15 B3. IV	1.80	0.79	4.58	76.01	0.75	8.92	n. d.	n. d.	n. d.		0.13	6.71	0.93	S 0.05	100.67	
16 D3. IV	1.41	2.09	57.83	20.49	0.58	1.85	n. d.	n. d.	0.20		(Ca10)	0.99	4.50		89.94	
17 B3. IV	29.60	11.12	21.14	18.64	3.96	6.00	n. d.	n. d.	1.40		6.48	0.08	0.26	SO ₂ 0.25	98.93	
18 B4. V	4.26	13.11	47.94	30.86	3.23	n. d.	n. d.	n. d.	n. d.		none				99.40	
19 C4. V	1.66	8.08	n. d.	18.43	12.47	0.91	n. d.	n. d.		0.20			0.20	Cr ₂ O ₃ 59.09	101.04	
20 C2. IV	9.89	5.40	70.83	0.54	2.41	0.92	n. d.	n. d.	5.41			0.02	0.27	S 0.05 Cr ₂ O ₃ 4.09 NiO 0.19 BaO none ZnO trace	100.01	
21 C2. IV	9.60	14.59	62.79	0.32	1.03	0.70	n. d.	n. d.	5.55			0.33	0.51	CO ₂ 0.55 S 0.03 Cr ₂ O ₃ 3.40 NiO 0.88 BaO none As 0.01 CuO none ZnO none PbO none	99.98	
22 C3. V	7.44	4.85	73.37	1.97	3.15	trace	n. d.	n. d.	3.68			0.03	0.07	S 0.02 MnO 0.07 NiO 1.69	99.81	
23 C2. IV	7.40	13.75	65.86	0.19	0.77	0.20	n. d.	n. d.	4.80			0.03	0.47	CO ₂ 0.25 S 0.03 Cr ₂ O ₃ 3.58 NiO 0.64 BaO none As 0.01 Zn, Cu, Pb none	99.98	
24 C2. IV	6.65	6.80	74.29	0.39	1.26	0.48	n. d.	n. d.	4.60			0.03	0.51	CO ₂ 0.05 S 0.04 Cr ₂ O ₃ 3.05 NiO 0.90 As 0.02 CuO none ZnO trace PbO trace	99.96	
25 C2. IV	5.25	8.00	70.25	0.39	1.23	1.50	n. d.	n. d.	8.40			0.03	0.05	CO ₂ 1.50 S 0.03 Cr ₂ O ₃ 2.78 NiO 0.50 BaO none PbO trace	99.96	

IRON ORES, ETC.—Continued.

No.	Locality.	Analyst.	Reference.	Rock name.	Remarks.
9	Ankershus, near Ekersund, Norway.	A. Tamm.	C. F. Kolderup, Berg. Mus. Aarb., No. V, p. 178, 1896.	Ilmenitite.	Not in W. T.
10	Kyland, Ekersund, Norway.	Loof.	C. F. Kolderup, Berg. Mus. Aarb., No. V, p. 178, 1896.	Ilmenitite.	Not in W. T.
11	Kyland, Ekersund, Norway.	Loof.	C. F. Kolderup, Berg. Mus. Aarb., No. V, p. 178, 1896.	Ilmenitite.	Not in W. T.
12	Ekströmsberg, Lapland, Sweden.	Not stated.	Lundbohm and Petersson, Iron Ore Res., II, p. 581, 1910.	Iron ore.	FeO=Fe ₃ O ₄ . Other analyses in paper.
13	Leveäniemi, Lapland, Sweden.	Not stated.	Lundbohm and Petersson, Iron Ore Res., II, p. 580, 1910.	Iron ore.	FeO=Fe ₃ O ₄ . Other analyses in paper.
14	Luossavara, Lapland, Sweden.	Not stated.	Lundbohm and Petersson, Iron Ore Res., II, p. 561, 1910.	Iron ore.	FeO=Fe ₃ O ₄ . Other analyses in paper.
15	Kirunavaara, Lapland, Sweden.	Not stated.	Lundbohm and Petersson, Iron Ore Res., II, p. 561, 1910.	Iron ore.	FeO=Fe ₃ O ₄ . Other analyses in paper.
16	Rödekoruberg, near Lulea, Sweden.	E. Bengtson.	P. Geijer, G. F. F., XXXIV, p. 191, 1912.	Iron ore.	TiO ₂ n. d.
17	Joubrechikine, Wichera, Ural Mountains.	Mine analysts.	Duparc et al., Oural Nord., III, p. 187, 1909.	Magnetite rock.	
18	Deneschkin Kamen, Ural Mountains.	Kultacheff.	F. Loewinson-Lessing, Jushno-Saas., p. 166, 1900.	Magnetite rock.	Layers in gabbro. No TiO ₂ ? Not in W. T.
19	Psemjonowka, Kuban District, Caucasus.	N. M. Slawsky.	N. Besborodko, N. J. B. B., XXXIV, p. 791, 1912.	Chromite ore.	
20	Lutzi, Lokris, Greece.	Not stated.	H. K. Scott, J. Iron St. Inst., LXXXVII, p. 465, 1913.	Chrome iron ore.	
21	Thebes, Bocotia, Greece.	Pattinson and Stead.	H. K. Scott, J. Iron St. Inst., LXXXVII, p. 465, 1913.	Chrome iron ore.	3 decimals.
22	Politika, Euboea, Greece.	E. Riley.	H. K. Scott, J. Iron St. Inst., LXXXVII, p. 465, 1913.	Chrome iron ore.	
23	Larnes, Lokris, Greece.	Pattinson and Stead.	H. K. Scott, J. Iron St. Inst., LXXXVII, p. 465, 1913.	Chrome iron ore.	3 decimals.
24	Tsouka, Lokris, Greece.	Pattinson and Stead.	H. K. Scott, J. Iron St. Inst., LXXXVII, p. 465, 1913.	Chrome iron ore.	3 decimals.
25	Karditza, Boeotia, Greece.	Pattinson and Stead.	H. K. Scott, J. Iron St. Inst., LXXXVII, p. 465, 1913.	Chrome iron ore.	3 decimals.

APPENDIXES.

APPENDIX 1.

THE QUANTITATIVE CLASSIFICATION OF IGNEOUS ROCKS.

INTRODUCTION.

As the original publications¹ on the quantitative system of classification and on some modifications of it, as well as some more recent descriptions,² may not be readily available to many readers, a concise account of it is given here. More complete details are given in those publications as well as in published discussions of the classification.³

GENERAL PRINCIPLES.

The system is a quantitative chemico-mineralogical one. The chemical composition of igneous rocks is regarded as more fundamental than their mineral composition or their texture, so that all igneous rocks, irrespective of the commonness or rarity of their occurrence, are classified primarily according to their chemical composition, with the object of grouping together rocks of like chemical composition, within limits. This phase alone of the classification concerns us here; mineral composition and texture, which are regarded as of subordinate importance, will not here be considered.

The chemical character of a rock is expressed in terms of the *molecules* of certain minerals that are capable of crystallizing on the solidification of a magma of a given chemical composition. The expression of the relations of these molecules is quantitative. For this purpose a selection is made of the molecules of the rock-making minerals which agree so far as is possible (and in fact do so to a very large extent) with the actual rock-making minerals. These

mineral molecules are known as *standard*, the minerals that actually make up the rock being called *modal*. For a proper comprehension of the system of classification it is of the utmost importance to bear the distinction in mind, and to grasp the fact, that the standard mineral molecules used are *molecules* and *not minerals*. This point was not sufficiently emphasized in the original publication, and the neglect to state it explicitly has led to some misunderstanding and consequently some unjustified adverse criticisms of the classification.

The modal aluminous pyroxenes, amphiboles, micas, garnets, and melilite (called collectively *alferic* minerals), being very complex and variable in composition, are not included in the standard minerals and are not regarded in this phase of the classification, for reasons of practicality given in the original papers.

The composition of the rock expressed in terms of the standard mineral molecules is called the *norm*, and the actual mineral composition, expressed quantitatively, is called the *mode*. The norm may or may not correspond with the mode, but as nearly all the standard molecules actually express commonly occurring rock minerals (mixtures of isomorphous molecules, as in the feldspars, being taken into account), the norm and the mode correspond very closely with each other in very many, if not the majority, of holocrystalline rocks.

CONSTRUCTION OF THE SYSTEM.

In the construction of the system as outlined above, two considerations, involved in the characters of rocks, are of paramount importance. These are the number of variables that must be dealt with and the unbroken continuity of gradation between all the factors of the same category involved in the problem. The constituents that may enter into the chemical composition or into the norm of a rock are numerous, the number of chemical constituents to be considered in a superior analysis being scarcely ever less than 10 and possibly reaching 20, and the number of standard mineral molecules about 30. The fact is now generally recognized that there are no sharp or "natural" divisions between igneous rocks, as these grade into one another in every respect, whether of chemical composition, mineral composition, or texture, the last including either crystallinity, granularity, or fabric.

It has been found that the best if not the only practicable way of dealing systematically with the

¹ Cross, Whitman, Iddings, J. P., Pirsson, L. V., Washington, H. S., A chemico-mineralogical classification and nomenclature of igneous rocks: Jour. Geology, vol. 10, pp. 555-690, 1902; Quantitative classification of igneous rocks, pp. 95-284, Chicago, 1903; The texture of igneous rocks: Jour. Geology, vol. 14, pp. 692-707, 1906; Modifications of the quantitative system of classification: Jour. Geology, vol. 20, pp. 550-561, 1912. Washington, H. S., The calculation of calcium orthosilicate in the norm: Washington Acad. Sci. Jour., vol. 5, p. 345, 1915.

² Iddings, J. P., Igneous rocks, vol. 1, pp. 394-454, 1909. Finlay, G. I., Introduction to the study of igneous rocks, pp. 143-221, New York, 1913. Washington, H. S., I basalti analitici della Sardegna: Soc. Geol. Ital. Boll., vol. 33, pp. 159-167, 1914.

³ Michel Lévy, Principales séries volcaniques françaises: Serv. carte géol. France Bull. 92, 1903; Principales séries éruptives françaises: Serv. carte géol. France Bull. 96, 1903. Card, G. W., The classification of the igneous rocks: Mining Journal, 1904, p. (3). Evans, J. W., The quantitative classification of igneous rocks: Sci. Progress, 1906, p. 1. Hatch, F. H., The classification of the plutonic rocks: Sci. Progress, 1908, p. 1. Harker, A., The natural history of igneous rocks, pp. 362-366, 1909. Fletcher, L., Introduction to the study of rocks, pp. 143-149, 1909. Cross, Whitman, The natural classification of igneous rocks: Geol. Soc. Quart. Jour., vol. 66, pp. 493-502, 1910. Certain criticisms of the quantitative classification: 11th Cong. géol. internat., Compt. rend., pp. 971-976, 1912. Fennor, L. L., The systematic position of the kodurite series: Geol. Survey India Rec., vol. 42, pp. 208-230, 1912. Mennell, F. P., Manual of petrology, p. 87, 1913. Daly, R. A., Igneous rocks and their origin, pp. 9-12, 1914. Tyrrell, G. W., A review of igneous rock classification: Sci. Progress, pp. 60-84, 1914. Milch, L., Die systematik der Eruptivgesteine: Fortschritte Mineralogie, vol. 4, pp. 218-222, 1914. Cross, Whitman, Problems of petrographic classification suggested by the kodurite series: Jour. Geology, vol. 22, p. 791, 1914.

numerous variables of the norm is to treat them dichotomously—that is, to divide them into a series of pairs of contrasted variables, each successive pair expressing characters of successively less generality or magnitude and of correspondingly greater particularity and definiteness.

The use of percentages to express the relations of the two variables is preferable to the use of ratios, which were used in the original publication, because the use of ratios involves the consideration of hyperbolic curves, thus tending to conceal the true relations.¹ Statement in percentages is commonly used for the graphs of physical chemistry.

The continuous gradation in the character of rocks and the absence of natural divisions necessitate arbitrary divisions, in making which, furthermore, the fact must be considered that in any pair either one of the variables may be present to the exclusion of the other. In the present system of classification this arbitrary division is accomplished by selecting five center points, which seem to be those that are most obvious and practical in showing the relations of two variables in any pair. These center points are indicated below, the relations being expressed both in percentages and ratios. It should be noted that these and all subsequent percentages here given express only the sum of the amounts of the two variables contrasted. They are not percentages of the norm (except in classes) or of the rock.

Two center points are used where one variable, A or B, is present to the exclusion of the other. A=100, B=0; or A=0, B=100. A:B=1:0 or 0:1.

One center point is used where both variables are present in equal amount. A=50, B=50. A:B=1:1.

Two intermediate center points are used where the amount of one variable is three times that of the other. A=75, B=25; or A=25, B=75. A:B=3:1 or 1:3.

The limits of the divisions of a series marked by these center points are where the percentages are as follows: A=87.5, B=12.5; A=62.5, B=37.5; A=37.5, B=62.5; A=37.5, B=62.5; A=12.5, B=87.5. The corresponding ratios are A:B=7:1, 5:3, 3:5, 1:7.

If one of a pair of variables is present in amount equal to or greater than 12.5 per cent of the two it is said to be *notable*, but if its amount is less than this it is said to be *negligible*.

These general divisions are numbered and defined as follows, the prefix being annexed that indicates the relation in the nomenclature.

1. A is *extreme* over B, B being *negligible*. Prefix *per*, applied to A.

2. A is *dominant* over B, both being *notable*. Prefix *do* (*dom*), applied to A.

3. A is *equal* (or nearly equal) to B, both being *notable*. No prefix is used.

4. B is *dominant* over A, both being *notable*. Prefix *do* (*dom*), applied to B.

5. B is *extreme* over A, A being *negligible*. Prefix *per*, applied to B.

In the first two and in the last two divisions A and B are spoken of, respectively, as *preponderant* (prefix *pre*), the other being *subordinate* (no prefix used). When one variable is subordinate to the other (as B in 2 and A in 4), its further subdivision, when needed, is on a threefold basis, as follows:

1-2. A is *preponderant* over B. Prefix *pre*, applied to A.

3. A is *equal* (nearly equal) to B. No prefix used.

4-5. B is *preponderant* over A. Prefix *pre*, applied to B.

Subdivision of either variable is only called for when it is in notable amount; when it is negligible (as B in 1 and A in 5) there is no subdivision.

OUTLINE OF THE SYSTEM.

DIVISIONS.

The divisions made in accordance with the principles stated and the terminations that distinguish the divisions are as follows:

Class (-ane).	Subclass (-one).
Order (-are).	Suborder (-ore).
Rang (-ase).	Subrang (-ose).
Grad (-ate).	Subgrad (-ote).

"Sections" of any of these are indicated by the insertion of "i" between the root and the regular termination.

Of these divisions, class, subclass, order, suborder, rang, and subrang are of chief interest here. The classification presented in this collection has not been carried as far as grad and subgrad, so that these will be treated very briefly.

For the purpose of carrying out this classification the standard mineral molecules,² in terms of which the norm is calculated—the normative molecules, are first divided into two groups. The first group of molecules called *salic*, characterized in general by the presence of silica and alumina, includes the molecules of quartz, corundum, zircon, orthoclase, albite, anorthite, leucite, nephelite, and a few others of minor importance. The second, called *femic*, characterized by being nonaluminous and in general by the presence of magnesia and iron oxides, includes the molecules of acmite, diopside, hypersthene, wollastonite, olivine, calcium orthosilicate, magnetite, ilmenite, hematite, apatite, and a few others of minor importance. In the course of the classification each of these two groups will be further subdivided into parts and these into still smaller divisions.

A diagrammatic scheme of the classification is shown in figure 2. This is necessarily incomplete and expresses in detail only the chief successions of divisions, which, however, include most of the igneous rocks.

¹ Cf. Michel Lévy, *Serv. carte géol. France Bull.* 92, p. 25, 1903; also Washington, H. S., *Jour. Geology*, vol. 15, p. 277, 1907.

² A list of the standard mineral molecules will be found on p. 1163.

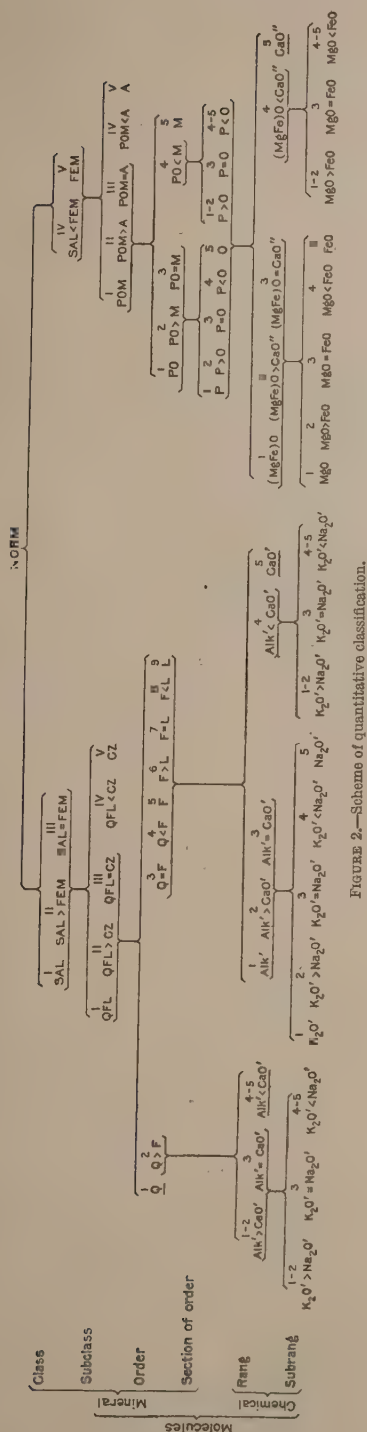


FIGURE 2.—Scheme of quantitative classification.

CLASSES.

The classes are based on the relative amounts of the collective salic and femic molecules in the norm. There are five classes:

Class I (persalic). The salic molecules are extreme over the femic. Center point: sal=100, fem=0; sal:fem=1:0. Limits: sal $\leq 100 > 87.5$; fem $\leq 0 > 12.5$; sal:fem=1:0.

Class II (dosalic). The salic molecules are dominant over the femic. Center point: sal=75, fem=25; sal:fem=3:1. Limits: sal $\leq 87.5 > 62.5$, fem $\geq 12.5 < 37.5$; sal:fem $\leq 7:1 > 5:3$.

Class III (salfemic). The salic and femic molecules are equal or nearly equal in amount. Center point: sal=50, fem=50; sal:fem=1:1. Limits: sal $\leq 62.5 > 37.5$; fem $\geq 37.5 < 62.5$; sal:fem $\leq 5:3 > 3:5$.

Class IV (dofemic). The femic molecules are dominant over the salic. Center point: sal=25, fem=75; sal:fem=1:3. Limits: sal $< 37.5 \geq 12.5$, fem $> 62.5 \leq 87.5$; sal:fem $< 3:5 \geq 1:7$.

Class V (perfemic). The femic molecules are extreme over the salic. Center point: sal=0, fem=100; sal:fem=0:1. Limits: sal $< 12.5 \geq 0$, fem $> 87.5 \leq 100$.

In subdividing the classes as far down as and including subrang, only the salic molecules are considered in Classes I, II, and III, and only the femic in Classes IV and V. In Class III the amount of the femic molecules may equal or even exceed (up to the limit) that of the salic molecules; but here the femic group is treated as subordinate for reasons given in the original publication and also by Iddings.¹

SUBCLASSES.

The subclasses are based on the relative amounts of certain parts into which the salic and femic groups are divided, as follows:

- Sal { Part 1. Quartz (Q), feldspars (F), feldspathoids (L).
Part 2. Corundum (C), zircon (Z).
Fem { Part 1. Pyroxenes (P); olivines and calcium orthosilicate (O); magnetite, hematite, ilmenite, rutile, titanite, perovskite (M).
Part 2. Apatite, fluorite, pyrite, etc. (A).

In Classes I, II, and III the division is fivefold and is made on the basis of the relations of the two variables (Q+F+L) and (C+Z). In Classes IV and V it is likewise fivefold but is made on the basis of the relations of the two variables (P+O+M) and (A). The center points and limits are identical in position with those of the classes. In Subclasses II, III, IV, and V of Classes I, II, and III the relative amounts of corundum (C) and zircon (Z) may be recognized by sections formed by contrasting these two variables in the same way, the division being threefold in Subclass II and fivefold in the others.

As most igneous rocks belong to Subclass I of any class, the succeeding description of the classification will pertain only to Subclass I of each class.

¹ Iddings, J. P., *Igneous rocks*, vol. 1, p. 411, 1913.

ORDERS.

The orders are based on the relative amounts of the subparts of mineral molecules that constitute part 1 of the salic and part 1 of the femic group.

In Classes I, II, and III the division is based on the molecules of part 1 of the salic group. To carry this division out rigidly Q should be contrasted first with (F+L), expressing thus the degree of excess of silica. But as was pointed out by Zirkel¹ quartz and the lenads² (leucite and nephelite) are incompatible—that is, they never coexist in igneous rocks, so far as known, and as the feldspars may occur with either, these three variables are treated serially—that is, as a combination of two pairs of variables, quartz molecules being contrasted with feldspar molecules, and these in turn, without a break, with lenad (feldspathoid) molecules. The division is doubly fivefold and these orders are defined as follows, the positions of the center points and limits being the same as with classes.

Orders of Classes I, II, and III.

- Order 1 (perquaric). Quartz extreme over feldspars.
- Order 2 (feldoquaric). Quartz dominant over feldspars.
- Order 3 (quarfelic). Quartz and feldspars equal.
- Order 4 (quardofelic). Feldspars dominant over quartz.
- Order 5 (perfelic). Feldspars extreme over quartz or lenads.
- Order 6 (lendofelic). Feldspars dominant over lenads.
- Order 7 (lenfelic). Feldspars and lenads equal.
- Order 8 (feldolenic). Lenads dominant over feldspars.
- Order 9 (perlenic). Lenads extreme over feldspars.

In Classes IV and V the division is based on the molecules of part 1 of the femic group. These are molecules of minerals that are not incompatible in igneous rocks, so that the division is not serial, as before, but fivefold and in two steps. For this purpose the silicate molecules of pyroxenes (P) and olivines (O) are first contrasted with the nonsilicates (M). This procedure is carried out as in the preceding divisions, the positions of the center points and limits being the same.

Orders of Classes IV and V.

- Order 1 (perpolic). P+O extreme over M.
- Order 2 (dopolic). P+O dominant over M.
- Order 3 (polmitic). P+O and M equal.
- Order 4 (domitic). M dominant over P+O.
- Order 5 (permitic). M extreme over P+O.

The relative amounts of the metasilicates (P) and the orthosilicates (O) are expressed analogously in sections of an order. In orders 1, 2, and 3 the division is fivefold and analogous to the preceding cases.

- Section 1 (perpyric). P extreme over O.
- Section 2 (dopyric). P dominant over O.
- Section 3 (pyrolic). P and O equal.
- Section 4 (domolic). O dominant over P.
- Section 5 (perolic). O extreme over P.

In order 4, as the factor P+O is subordinate, though notable, the division is threefold, as follows:

- Section 1-2 (prepyric). P preponderant over O.
- Section 3 (pyrolic). P and O equal.
- Section 4-5 (preolic). O preponderant over P.

In order 5, as the factor P+O is negligible, there is no subdivision.

SUBORDERS.

The classification into suborders involves a consideration of the different acidic radicals that may be present in the molecules so far considered and is based on their relative amounts. In Classes I, II, and III suborders are called for only in orders 7, 8, and 9, where they are based on the relative amounts of the silicate molecules (leucite and nephelite) and the chloride and sulphate molecules (halite and thenardite) in the norm, the relations between the last two being brought out in sections of these suborders. In orders 3, 4, and 5 of Classes IV and V the suborders are based on the relative amounts of the *hemic* molecules containing Fe_2O_3 (magnetite and hematite) and the *tilic* molecules containing TiO_2 (ilmenite, titanite, perovskite, rutile). As illustrating the extended possibility of classification in this system, it may be pointed out that the last four variables may be classified, if called for, by making subsections based on the contrasting of noncalcic ilmenite and rutile with calcic titanite and perovskite; each of these pairs being easily divided dichotomously in the same way.

As the need of the recognition of suborders seldom arises, and as they are formed quite analogously to the other divisions, they need not be further described.

RANGS.

The most general and the *acidic* characters of the preponderant molecules having been used in making the preceding divisions, the relations of the *basic* radicals of the normative mineral molecules are next considered for further divisions. These minor divisions are called rangs and subrang, and in these divisions oxide molecules and not mineral molecules are dealt with. Rangs are established on the general character of the basic oxide.

In the orders of Classes I, II, and III the rangs are based on the relations of total *salic* alkalies to *salic* lime—that is, the $\text{K}_2\text{O}' + \text{Na}_2\text{O}'$ and CaO' of normative feldspar and lenad molecules.

Salic alkalies comprise only those that enter into the molecules of normative orthoclase, albite, leucite, nephelite, kaliophilite, halite, and thenardite, denoted by $\text{K}_2\text{O}'$ and $\text{Na}_2\text{O}'$. The K_2O of K_2SiO_3 and the Na_2O of acmite and Na_2SiO_3 are femic and are denoted by $\text{K}_2\text{O}''$ and $\text{Na}_2\text{O}''$. *Salic* lime (CaO') is only that which enters into the normative anorthite molecule. The lime (CaO) of normative diopside, wollastonite, calcium orthosilicate, apatite, titanite, and perovskite

¹ Zirkel, Ferdinand, Lehrbuch der Petrographie, vol. 1, p. 646, 1893. Zirkel says:

"Hiervon ist bis jetzt eine Ausnahme nicht gefunden, so dass dies zur Zeit als ein wirkliches Gesetz gelten muss, allerdings fast das einzige dieser Art."

² Lenad is a term used to replace feldspathoid.

is femic (CaO''). Stress must be laid on this distinction, as it has been overlooked by some geologists, who have in consequence incorrectly determined the classificatory positions of some rocks.

In orders 3, 4, 5, 6, 7, and 8 (Classes I, II, and III), the division is fivefold and is carried out with the same center points and limits as before. In order 3 the quartz is fixed in composition, so that the division is applied to the chemically variable feldspars and lenads. In order 2, with subordinate feldspar, the division is only threefold, but rocks that fall here are very rare. The divisions are defined as follows:

- Rang 1 (peralkalic). Salic alkalies extreme over salic lime.
- Rang 2 (domalkalic). Salic alkalies dominant over salic lime.
- Rang 3 (alkalicalcic). Salic alkalies and salic lime equal.
- Rang 4 (docalcic). Salic lime dominant over salic alkalies.
- Rang 5 (percalcic). Salic lime extreme over salic alkalies.

In the orders of Classes IV and V the rangs are based on the relations of total magnesia, ferrous oxide (not including Fe_2O_3 calculated as FeO), and femic alkalies (practically always $\text{Na}_2\text{O}''$) to femic lime, a practice in accord with a recently published modification of the classification.¹ The divisions are as follows:

- Rang 1 (permiric). $\text{MgO} + \text{FeO} + \text{Na}_2\text{O}''$ extreme over CaO'' .
- Rang 2 (domiric). $\text{MgO} + \text{FeO} + \text{Na}_2\text{O}''$ dominant over CaO'' .
- Rang 3 (calcimiric). $\text{MgO} + \text{FeO} + \text{Na}_2\text{O}''$ and CaO'' equal.
- Rang 4 (docalcic). CaO'' dominant over $\text{MgO} + \text{FeO} + \text{Na}_2\text{O}''$.
- Rang 5 (percalcic). CaO'' extreme over $\text{MgO} + \text{FeO} + \text{Na}_2\text{O}''$.

SUBRANGS.

The subrangs are based on the relations of the oxides forming the compound to one of the two contrasted variables that are used for rangs. In Classes I, II, and III these are *salic* soda ($\text{Na}_2\text{O}'$) and *salic* potash ($\text{K}_2\text{O}'$). In rangs 1, 2, and 3 the division is fivefold, as follows:

- Subrang 1 (perpotassic). $\text{K}_2\text{O}'$ extreme over $\text{Na}_2\text{O}'$.
- Subrang 2 (dopotassic). $\text{K}_2\text{O}'$ dominant over $\text{Na}_2\text{O}'$.
- Subrang 3 (sodipotassic). $\text{K}_2\text{O}'$ and $\text{Na}_2\text{O}'$ equal.
- Subrang 4 (dosodic). $\text{Na}_2\text{O}'$ dominant over $\text{K}_2\text{O}'$.
- Subrang 5 (persodic). $\text{Na}_2\text{O}'$ extreme over $\text{K}_2\text{O}'$.

In the docalcic rangs of Classes I, II, and III the division is threefold.

- Subrang 1-2 (prepotassic). $\text{K}_2\text{O}'$ preponderant over $\text{Na}_2\text{O}'$.
- Subrang 3 (sodipotassic). $\text{K}_2\text{O}'$ and $\text{Na}_2\text{O}'$ equal.
- Subrang 4-5 (presodic). $\text{Na}_2\text{O}'$ preponderant over $\text{K}_2\text{O}'$.

In the percalcic rangs 5 there is no division into subrangs, as the alkalies are negligible.

In Classes IV and V the contrasted factors are MgO and $\text{FeO} + \text{Na}_2\text{O}''$. In rangs 1, 2, and 3 the division is fivefold, as follows:

- Subrang 1 (permagnesic). MgO extreme over $\text{FeO} + \text{Na}_2\text{O}''$.
- Subrang 2 (domagnesic). MgO dominant over $\text{FeO} + \text{Na}_2\text{O}''$.
- Subrang 3 (magnesianiferous). MgO and $\text{FeO} + \text{Na}_2\text{O}''$ equal.
- Subrang 4 (doferrous). $\text{FeO} + \text{Na}_2\text{O}''$ dominant over MgO .
- Subrang 5 (perferrous). $\text{FeO} + \text{Na}_2\text{O}''$ extreme over MgO .

In the docalcic rangs 4 the division is threefold, as described above; and in the percalcic rangs 5 there is no division into subrangs.

In a very few rocks the amount of femic soda is so great that recognition of the relative amounts of FeO and $\text{Na}_2\text{O}''$ is called for and is expressed in sections of subrangs, FeO preceding.

GRADS AND SUBGRADS.

In the divisions called grads and subgrads and in sections of them are expressed the successively more detailed character of the *subordinate* normative molecule group in the various classes; the femic in Classes II and III and the salic in Class IV. These divisions are established precisely as are the divisions from order to subrang inclusive, though not with the same detail, as the variables dealt with are subordinate. In Classes I and V grads and subgrads are not called for, as the subordinate group is present in negligible amount. Grads and subgrads are disregarded in this collection of analyses, except that the symbols of the subordinate femic divisions are given in Class III, Salfemane.

NOMENCLATURE.

The nomenclature of the normative divisions of the classification is treated very briefly here. The names consist of a root and a termination, the termination indicating the relative position of the named division in the system. The terminations for the divisions are:

Class (-ane).	Subclass (-one).
Order (-are).	Suborder (-ore).
Rang (-ase).	Subrang (-ose).
Grad (-ate).	Subgrad (-ote).

Sections of any of these divisions are indicated by inserting an "i" between the root and the termination.

The roots of classes are mnemonic of the contrasted factors on which they are based, and the names of the five classes are as follows:

- Class I. Persalane. Sal extreme over fem.
- Class II. Dosalane. Sal dominant over fem.
- Class III. Salfemane. Sal and fem equal.
- Class IV. Dofemane. Fem dominant over sal.
- Class V. Perfemane. Fem extreme over sal.

The names for subclasses that were originally proposed (persalone, dosalone, salfemone, dofemone, perfemone) are clearly incorrect and unsystematic, and they must therefore be rejected. They are incorrect and not properly mnemonic in that they are not based on the variables used to form subclasses, namely, $(Q + F + L)$ and $(C + Z)$ in Classes I, II, and III and $(P + O + M)$ and (A) in Classes IV and V; they are not precise in their applications, and they are unsystematic because other subclasses of the same class can not be formed analogously. Mnemonic systematic names, precise in their application, can be devised for subclasses, but they would be awkwardly long.

¹ Jour. Geology, vol. 20, p. 552, 1912.

For example, adopting *quafel* as mnemonic of QFL and *corz* as mnemonic of CZ, the name of Subclass I of persalane would be perquafelpersalone; that of Subclass III of persalane (cf. p. 325) would be quafelcorzpersalone; and that of Subclass II of salfemane (cf. p. 703) would be doquafelsalfemone. Subclass II of Class IV (p. 732) would thus be named dopomdofemone. Similarly formed mnemonic names for divisions below a subclass would become still more complex and unmanageable; thus the order canadare might be systematically and mnemonically called perfelperquafelpersalone.

As the known representatives of subclasses other than Subclass I are still very few, it will be as well, for the present, not to name subclasses.

The names of most of the orders and suborders are based on the names of countries and nations, and occasionally such roots are used for lower orders, but most of the roots of the rangs and subrang are based on smaller geographic units. Many of the roots of the common rock names are also used.

LIMITS AND SYMBOLS OF THE DIVISIONS.

Figure 3¹ shows the percentages and decimal ratios that determine the limits of the different divisions—central, intermediate, distal, and transitional—and the symbols that indicate them as they have been used in Part I of the collection (pp. 49-747). In Classes I, II, and III the perfelic order 5 is of the same extent as the other orders, but as it intervenes between quardofelic order 4 and lendofelic order 6, this particular division should be twice as long as it is represented on the scale, the scale being continued to include the succeeding orders.² Any misapprehension of this point can be obviated by considering that the lenadic half of order 5 in Classes I, II, and III is represented in the figure by order 1, order 6 by order 2, order 7 by order 3, order 8 by order 4, and order 9 by the scalar half of order 5. This applies only to orders in Classes I, II, and III.

It may be well to give illustrations of the meanings of the several terms and symbols that are used to indicate the relative position of a rock in a division of the quantitative system, reference being made to

figure 3 and attention being confined to the division, between ratios 1.667 and 0.600. This position is "central" between ratios 1.286 and 0.778, the symbol being a simple 3; "intermediate" stands between

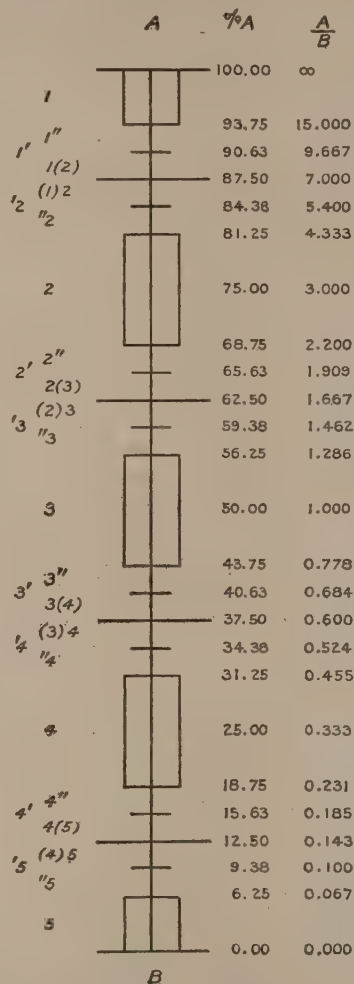


FIGURE 3.—Diagram showing limits of divisions, center points, and symbols of the quantitative classification.

ratios 1.667 and 1.286, or 0.778 and 0.600, the symbol being respectively '3 and 3'; "distal" stands between 1.462 and 1.286, or 0.778 and 0.684, the symbols being respectively '3 and 3''; and "transitional" stands between 1.667 and 1.462, or 0.684 and 0.600, the symbols being respectively (2)3 and 3(4).

¹ Cross, Whitman, Iddings, J. P., Pirsson, L. V., and Washington, H. S., Jour. Geology, vol. 20, p. 556, figs. 1 and 2, 1912.

² Cross, Whitman, Iddings, J. P., Pirsson, L. V., and Washington, H. S., Quantitative classification of igneous rocks, p. 132, Chicago, 1903.

APPENDIX 2.

TABULAR PRESENTATION OF THE DIVISIONS AND NAMES OF THE QUANTITATIVE CLASSIFICATION.

The accompanying tabulation of the quantitative system is similar to that which was published in Professional Paper 14, but it contains also the names that have been proposed since that work was published and that are here accepted (pp. 34-36) as well as a number of names for hitherto-unnamed divisions that have been proposed by me and by several others and that are now published for the first time.

An x in a divisional space indicates that the analyses of rocks that belong here are included in Part I of the collection but that no name is proposed for the division. The absence of a name or of an x implies that no analysis of a rock is yet known or included in Part I that would occupy that position in the system.

The table may be regarded as a concise and definitive statement of all the names of the divisions of the quantitative system accepted by its authors up to the end of 1916, except those for divisions of Subclasses II, III, IV, and V, distinguished by notable amounts of normative corundum, zircon, or apatite. The names of those divisions which have been accepted will be found in Part I of the collection.

To each divisional name is added the number of analyses in Part I of the collection that fall in the division, except those which fall in the subclasses just mentioned, which are omitted from the table.

TABLE I.—CLASS I, PERSALANE. SUBCLASS I (2050).

Order.....	1. Victorare 3	2. Belgare 24	3. Columbare 399	4. Britannare 1232	5. Canadare 267	6. Russare 111	7. Tasmanare 8	8. Ontarare 2	9. Laurentare 2
Rang 1.....	1. x 3	1-2. Dargase 15	1. Alaskase 182	1. Liparase 444	1. Nordmarkase 118	1. Miaskase 84	1. Laugenase 8	1. Hochelagase 1	1. Congressase 2
Subrang 1.....		1-2. Arizonose 9	1. Bisbose 9	1. Lebachose 12	1. Hettose 1	1.....	1.....	1.....	1.....
Subrang 2.....			2. Magdeburgose 31	2. Omeose 33	2. x 1	2.....	2.....	2.....	2.....
Subrang 3.....		3. Cardiffose 3	3. Alaskose 101	3. Liparose 299	3. Phlegrose 48	3. Beemerose 12	3. Appianose 2	3.....	3.....
Subrang 4.....			4. Tordrillose 27	4. Källerudose 85	4. Nordmarkose 63	4. Miaskose 72	4. Laugenose 5	4. Hochelagose 1	4. Congressose 1
Subrang 5.....		4-5. x 3	5. Westphalose 14	5. Noyangose 14	5. Tuolumnose 5	5. Mariupolose 0	5. x 1	5.....	5. x 1
Rang 2.....		2.....0	2. Alsbachase 162	2. Toscanase 616	2. Pulaskase 117	2. Viezzenase 27	2.....	2. Monmouthase 1	
Subrang 1.....		1.....	1. x 2	1. x 1	1.....	1.....	1.....	1.....	
Subrang 2.....		2.....	2. Mihalose 8	2. Dellenose 22	2. Vulsinose 9	2.....	2.....	2.....	
Subrang 3.....		3.....	3. Tehamose 96	3. Toscanose 381	3. Pulaskose 47	3. x 5	3.....	3.....	
Subrang 4.....		4.....	4. Alsbachose 45	4. Lassenose 203	4. Larvikose 58	4. Viezzenose 21	4.....	4. Monmouthase 1	
Subrang 5.....		5.....	5. Yukonose 11	5. Mariposose 9	5. x 3	5. Raglanose 1	5.....	5.....	
Rang 3.....		3. x 7	3. Riesenase 49	3. Coloradase 170	3. Piedmontase 12	3.....	3.....		
Subrang 1.....		1-2. x 5	1.....	1.....	1.....				
Subrang 2.....			2. x 2	2. x 2	2. Mazarunose 1				
Subrang 3.....		3. x 1	3. Riesenose 28	3. Amiatose 54	3. x 1				
Subrang 4.....			4. Susquehannose 11	4. Yellowstonose 106	4. Piedmontose 7				
Subrang 5.....		4-5. x 1	5. x 8	5. Amadorose 8	5. Kitlimose 3				
Rang 4.....		4. x 2	4. x 6	4. x 4	4. Labradorase 12	4.....			
Subrang 1-2.....		1-2. x 1	1-2.....	1-2.....	1-2.....				
Subrang 3.....		3.....	3. x 3	3.....	3.....				
Subrang 4-5.....		4-5. x 1	4-5. x 3	4-5. x 4	4-5. Labradorose 12				
Rang 5.....			5.....	5.....	5. Canadase 8				

TABLE IV.—CLASS IV, DOFEMANE (171).

Order.....	1. Hungarare (81)									
Section.....	1. Minnesotiare	20	2. Quebeciare	25	3. Hungariare	22	4. x	9	5. Pyreniare	5
Rang 1.....	1. Minnesotase	10	1. Hilase	6	1. Wehrlase	5	1. Cortlandtase	9	1. Lherzase	4
Subrang 1.....	1. x	2	1. Hilose	6	1. Wehrlase	5	1. Cortlandtose	2	1. Lherzose	1
Subrang 2.....	2. Cookose	8	2. Hilose	6	2. Wehrlase	5	2. Custerose	7	2. Argeinose	3
Subrang 3.....	3.	...	3.	...	3.	...	3.	...	3.	...
Subrang 4.....	4.	...	4.	...	4.	...	4.	...	4.	...
Subrang 5.....	5.	...	5.	...	5.	...	5.	...	5.	...
Rang 2.....	2. x	9	2. Brunase	18	2. Rosswelase	17	2.	...	2.	...
Subrang 1.....	1. x	9	1. Belcherose	2	1. Jumillose	3	1.	...	1.	...
Subrang 2.....	2. x	9	2. Pallsadose	16	2. Rosswelase	13	2.	...	2.	...
Subrang 3.....	3.	...	3.	...	3. x	1	3.	...	3.	...
Subrang 4.....	4.	...	4.	...	4. x	1	4.	...	4.	...
Subrang 5.....	5.	...	5.	...	5.	...	5.	...	5.	...
Rang 3.....	3. x	1	3. x	1	3.	...	3.	...	3. Venanziasse	1
Subrang 1.....	1.	...	1.	...	1.	...	1.	...	1. Venanzose	1
Subrang 2.....	2.	...	2.	...	2.	...	2.	...	2. Venanzose	1
Subrang 3.....	3.	...	3. x	1	3.	...	3.	...	3. Venanzose	1
Subrang 4.....	4. x	1	4.	...	4.	...	4.	...	4.	...
Subrang 5.....	5.	...	5.	...	5.	...	5.	...	5.	...

Order.....	2. Sootare (63).									
Section.....	1. x	8	2. Pauliare	20	3. Texiare	22	4. x	9	5. x	4
Rang 1.....	1. x	1	1. Valbonnase	2	1. Marquettase	1	1. x	4	1. Kaltenase	1
Subrang 1.....	1.	...	1. Valbonnase	1	1. Marquettase	1	1. x	1	1.	...
Subrang 2.....	2. x	1	2. Valbonnase	1	2. Marquettase	1	2. x	3	2. x	4
Subrang 3.....	3.	...	3.	...	3.	...	3.	...	3. Kaltenase	1
Subrang 4.....	4.	...	4.	...	4.	...	4.	...	4.	...
Subrang 5.....	5.	...	5.	...	5.	...	5.	...	5.	...
Rang 2.....	2. Yamaskase	2	2. Montrealase	15	2. Texase	18	2. Casselase	5	2. x	1
Subrang 1.....	1. Yamaskase	1	1. Montrealase	12	1. Uvaldose	18	1. Casselase	4	1. x	1
Subrang 2.....	2. Yamaskase	1	2. Montrealase	12	2. Uvaldose	18	2. Casselase	4	2. x	1
Subrang 3.....	3. x	1	3. x	3	3.	...	3. x	1	3.	...
Subrang 4.....	4.	...	4.	...	4.	...	4.	...	4.	...
Subrang 5.....	5.	...	5.	...	5.	...	5.	...	5.	...
Rang 3.....	3. Brandbergase	5	3. Paulase	3	3. x	3	3.	...	3. x	1
Subrang 1.....	1. Brandbergase	4	1. Paulase	3	1. Naketose	3	1.	...	1. x	1
Subrang 2.....	2. Brandbergase	1	2. Paulase	3	2. Naketose	3	2.	...	2. x	1
Subrang 3.....	3. x	1	3. Paulase	3	3. Naketose	3	3.	...	3.	...
Subrang 4.....	4.	...	4.	...	4.	...	4.	...	4.	...
Subrang 5.....	5.	...	5.	...	5.	...	5.	...	5.	...

Order.....	3. Sverigare (11).									
Section.....	1. Bergeniare	7	2. x	2	3. Uteiare	1	4.	...	5. Sverigiare	1
Rang 1.....	1. Bergenase	3	1.	...	1.	...	1.	...	1. x	1
Subrang 1.....	1.	...	1.	...	1.	...	1.	...	1.	...
Subrang 2.....	2.	...	2.	...	2.	...	2.	...	2.	...
Subrang 3.....	3. Bergenase	1	3.	...	3.	...	3.	...	3.	...
Subrang 4.....	4. x	1	4.	...	4.	...	4.	...	4. x	1
Subrang 5.....	5. x	1	5.	...	5.	...	5.	...	5.	...
Rang 2.....	2. Tuxenase	1	2. x	1	2. Eldorase	1	2.	...	2.	...
Subrang 1.....	1.	...	1. x	1	1. Eldorase	1	1.	...	1.	...
Subrang 2.....	2.	...	2. x	1	2. Eldorase	1	2.	...	2.	...
Subrang 3.....	3. Tuxenase	1	3.	...	3. Eldorase	1	3.	...	3.	...
Subrang 4.....	4.	...	4.	...	4.	...	4.	...	4.	...
Subrang 5.....	5.	...	5.	...	5.	...	5.	...	5.	...
Rang 3.....	3. Ijussase	3	3. Avezacase	1	3.	...	3.	...	3.	...
Subrang 1.....	1. Ijussase	2	1. Avezacase	1	1.	...	1.	...	1.	...
Subrang 2.....	2. Ijussase	1	2. Avezacase	1	2.	...	2.	...	2.	...
Subrang 3.....	3. Ijussase	2	3. Avezacase	1	3.	...	3.	...	3.	...
Subrang 4.....	4.	...	4.	...	4.	...	4.	...	4.	...
Subrang 5.....	5.	...	5.	...	5.	...	5.	...	5.	...

TABLE IV.—CLASS IV, DOFEMANE (171)—Continued.

Order		4. Adirondackare (10).					
Suborder		1. x 1	2. Adirondackare 4	3. Champlainare 5			
Rang 1		1. Arapahase 1	1. Adirondackare 4	1. Champlainare 5			
Subrang 1		1. x 1	1. x 4	1. x 5			
Subrang 2		2. x 1	2. x 4	2. x 5			
Subrang 3		3. x 1	3. x 4	3. x 5			
Subrang 4		4. Arapahase 1	4. Adirondackare 3	4. Champlainare 3			
Subrang 5		5. x 1	5. x 4	5. x 5			
Rang 2		2. x 1	2. x 4	2. x 5			
Subrang 1		2. x 1	2. x 4	2. x 5			
Subrang 2		2. x 1	2. x 4	2. x 5			
Subrang 3		2. x 1	2. x 4	2. x 5			
Subrang 4		2. x 1	2. x 4	2. x 5			
Subrang 5		2. x 1	2. x 4	2. x 5			
Rang 3		3. x 1	3. x 4	3. x 5			
Subrang 1		3. x 1	3. x 4	3. x 5			
Subrang 2		3. x 1	3. x 4	3. x 5			
Subrang 3		3. x 1	3. x 4	3. x 5			
Subrang 4		3. x 1	3. x 4	3. x 5			
Subrang 5		3. x 1	3. x 4	3. x 5			

Order		5. Cordillerare (6).					
Suborder		1. x 1	2. x 4	3. x 1			
Rang 1		1. x 1	1. Pomerare 4	1. x 1			
Subrang 1		1. x 1	1. x 4	1. x 1			
Subrang 2		2. x 1	2. x 4	2. x 1			
Subrang 3		3. x 1	3. x 4	3. x 1			
Subrang 4		4. x 1	4. Pomerare 3	4. x 1			
Subrang 5		5. x 1	5. x 4	5. x 1			

TABLE V.—CLASS V, PERFEMANE (57).

Order		1. Maorare (38).									
Section		1. Carolinare.....10	2. Marylandare.....5	3. Saxonare.....2	4. Helvetiare.....14	5. Maorare.....7					
Rang 1		1. Maricase.....3	1. x 1	1. x 1	1. Gordunare.....14	1. Dunare.....7					
Subrang 1		1. Maricase.....2	1. x 1	1. x 1	1. Gordunare.....13	1. Dunare.....4					
Subrang 2		2. x 1	2. x 1	2. x 1	2. Kakoulmose.....1	2. Guineose.....3					
Subrang 3		3. x 1	3. x 1	3. x 1	3. x 1	3. x 1					
Subrang 4		4. x 1	4. x 1	4. x 1	4. x 1	4. x 1					
Subrang 5		5. x 1	5. x 1	5. x 1	5. x 1	5. x 1					
Rang 2		2. Websterare.....5	2. Baltimorare.....4	2. Kosware.....1	2. x 1	2. x 1					
Subrang 1		1. Websterare.....3	1. x 1	1. x 1	1. x 1	1. x 1					
Subrang 2		2. Cecilose.....2	2. Baltimorare.....3	2. Kosware.....1	2. x 1	2. x 1					
Subrang 3		3. x 1	3. x 1	3. x 1	3. x 1	3. x 1					
Subrang 4		4. x 1	4. x 1	4. x 1	4. x 1	4. x 1					
Subrang 5		5. x 1	5. x 1	5. x 1	5. x 1	5. x 1					
Rang 3		3. x 2	3. x 2	3. x 2	3. x 2	3. x 2					
Subrang 1		1. x 2	1. x 2	1. x 2	1. x 2	1. x 2					
Subrang 2		2. x 2	2. x 2	2. x 2	2. x 2	2. x 2					
Subrang 3		3. x 2	3. x 2	3. x 2	3. x 2	3. x 2					
Subrang 4		4. x 2	4. x 2	4. x 2	4. x 2	4. x 2					
Subrang 5		5. x 2	5. x 2	5. x 2	5. x 2	5. x 2					

Order		2. No name (5).				
Section		1. x 3	2. x 1	4. x 1	5. x 1	
Rang 1		1. x 3	1. x 1	1. x 1	1. x 1	1. Permase.....1
Subrang 1		1. x 3	1. x 1	1. x 1	1. x 1	2. Permase.....1
Subrang 2		2. x 3	2. x 1	2. x 1	2. x 1	3. x 1
Subrang 3		3. x 3	3. x 1	3. x 1	3. x 1	4. x 1
Subrang 4		4. x 3	4. x 1	4. x 1	4. x 1	5. x 1
Subrang 5		5. x 3	5. x 1	5. x 1	5. x 1	
Rang 2		2. x 1	2. x 1	2. x 1	2. x 1	2. x 1
Subrang 1		1. x 1	1. x 1	1. x 1	1. x 1	
Subrang 2		2. x 1	2. x 1	2. x 1	2. x 1	
Subrang 3		3. x 1	3. x 1	3. x 1	3. x 1	
Subrang 4		4. x 1	4. x 1	4. x 1	4. x 1	
Subrang 5		5. x 1	5. x 1	5. x 1	5. x 1	
Rang 3		3. Cebollase.....2	3. x 1	3. x 1	3. x 1	3. x 1
Subrang 1		1. Cebollase.....2	1. x 1	1. x 1	1. x 1	
Subrang 2		2. Cebollase.....2	2. x 1	2. x 1	2. x 1	
Subrang 3		3. x 1	3. x 1	3. x 1	3. x 1	
Subrang 4		4. x 1	4. x 1	4. x 1	4. x 1	
Subrang 5		5. x 1	5. x 1	5. x 1	5. x 1	

TABLE V.—CLASS V, PERFEMANE (57)—Continued.

Order.....	3. Rhodare (5).				
Section.....	1. x 2	2.....	3. Bouldiare.....1	4. x 1	5. x 1
Rang 1.....	1. x 2	1.....	1.....	1. x 1	1. Rhodare.....1
Subrang 1.....	1.....			1.....	1.....
Subrang 2.....	2.....			2. x 1	2.....
Subrang 3.....	3.....			3.....	3. Rhodare.....1
Subrang 4.....	4.....			4.....	4.....
Subrang 5.....	5. x 2			5.....	5.....
Rang 2.....			2. Cardinalase.....1		
Subrang 1.....			1.....		
Subrang 2.....			2. Cardinalase.....1		
Subrang 3.....			3.....		
Subrang 4.....			4.....		
Subrang 5.....			5.....		
Rang 3.....					
Subrang 1.....					
Subrang 2.....					
Subrang 3.....					
Subrang 4.....					
Subrang 5.....					
Order.....	4. No name (1).				
Section.....	1.	2. x 1	3. " 1	4.	5.
Rang 1.....	1.....	1. x 1	1.....	1.....	1.....
Subrang 1.....		1.....			
Subrang 2.....		2.....			
Subrang 3.....		3.....			
Subrang 4.....		4.....			
Subrang 5.....		5. x 1			
Rang 2.....					
Subrang 1.....					
Subrang 2.....					
Subrang 3.....					
Subrang 4.....					
Subrang 5.....					
Order.....	5. No name (8).				
Section.....	1. x 1	2. 3	3. 2	4. 2	5.
Rang 1.....	1. x 1	1. x 3	1. x 2	1. x 2	
Subrang 1.....	1.....	1.....	1.....	1.....	
Subrang 2.....	2.....	2.....	2.....	2.....	
Subrang 3.....	3.....	3.....	3.....	3.....	
Subrang 4.....	4.....	4. x 2	4. x 2	4. x 2	
Subrang 5.....	5. x 1	5. x 1	5.....	5.....	
Rang 2.....					
Subrang 1.....					
Subrang 2.....					
Subrang 3.....					
Subrang 4.....					
Subrang 5.....					

APPENDIX 3.

CALCULATION OF THE NORM.

INTRODUCTION.

Inasmuch as the exposition of the calculation of the norm in the quantitative system of classification and the tables of molecular numbers and percentage weights as originally published¹ may not now be readily accessible to all who use this collection of analyses, it has been thought that it would be useful to furnish these data in this volume.² The republication of this matter is the more advisable because the original statement of the calculation is very concise and because some changes have been suggested since the matter was first published.³ A very clear and detailed statement of the methods of calculation, illustrated by many examples and accompanied by the numerical tables, has lately been published by Finlay.⁴

In the present work considerable change has been made in the presentation of the calculation, though without altering its general principles, and the tables have been to some extent rearranged so as to make them more convenient for the ready calculation of the norms of the great majority of rocks. Some sections have been expanded and some contracted, as dictated by much experience, and a few errors have been corrected.

In the calculation of the norms of thousands of analyses I have found that the formal way of setting down the data in columns, as proposed in the original publication, followed by Finlay and generally used, involves some needless repetition and waste of time. Thus in calculating the feldspars and leucites there is no need of repeating for Al_2O_3 the figures for K_2O , Na_2O , and CaO ; or in calculating magnetite of setting down the figures for FeO and Fe_2O_3 , as they are necessarily identical. After several trials I have adopted and used for some years the arrangement shown in figure 1 (p. 37). By adopting such an arrangement, not putting down more figures than are necessary, and with a little practice and experience, it will be found

that the calculation of a norm takes but little time. For most rocks five minutes should suffice, but when readjustments have to be made (as because of deficiency in silica) the calculation may take ten minutes, or fifteen at the outside, in the most complicated norms.

The term *molecular number*⁵ is adopted here, instead of the commonly and previously used *molecular ratio*, *molecular proportion*, or the term *mol number*, suggested by Wright and Van Orstrand,⁶ because of the following considerations: The word *number* is preferable to *ratio* or *proportion* because the result obtained by dividing the weight percentage of any given constituent by its molecular weight is a number which is independent and irrespective of the other results similarly obtained. Thus, the result is not a ratio or proportion between such numbers. For rock analyses the term molecular is preferable to mol, as the quantities involved are molecules and are not related to any system of weights such as the definition of the term mol implies.

It is premised that in calculating the norm certain considerations should be borne in mind. The norm is the expression of the chemical composition of the rock in terms of standard mineral molecules, a list of which is given on page 1163. Some of the constituents enter only into "fixed" molecules, which are so called because they are incapable of change, whatever be the general chemical character of the rock. Thus ZrO_2 enters only into zircon (Z) as a standard mineral, P_2O_5 into apatite (ap), Cl into halite (hl), and so on. Other constituents may enter different mineral molecules according to the amounts of other constituents in the rock. Thus K_2O may enter orthoclase, leucite or kaliophilite; and Na_2O into albite or nephelite, according to the amount of available SiO_2 .

As regards Al_2O_3 , except when it is in excess of the sum of the alkalis and lime (the excess forming the corundum molecule), it is invariably present in the ratio of 1:1 with K_2O , Na_2O , or CaO in the silic minerals orthoclase, leucite, kaliophilite, albite, nephelite, and anorthite. Consequently, where molecules of these minerals are considered in the following pages

¹ Cross, Whitman, Iddings, J. P., Pirsson, L. V., Washington, H. S., The quantitative classification of igneous rocks, pp. 186-203, 236-259, 1903.

² This republication has been suggested by a number of petrographers, among them Prof. A. Lacroix, of Paris, and Prof. A. Johannsen, of Chicago.

³ Cross, Whitman, Iddings, J. P., Pirsson, L. V., Washington, H. S., Jour. Geology, vol. 20, p. 537, 1912; Washington, H. S., Wash. Acad. Sci. Jour., vol. 5, p. 345, 1915.

⁴ Finlay, G. I., Introduction to the study of igneous rocks, New York, 1913.

⁵ This term is used also by Finlay.

⁶ Wright and Van Orstrand, Wash. Acad. Sci. Jour., vol. 3, p. 223, 1913.

any mention of K_2O , Na_2O , or CaO implies the consideration of an equal molecular amount of Al_2O_3 . Stress must also be laid on the fact that only the CaO which with an equal amount of Al_2O_3 enters anorthite is salic. The excess of CaO over this is femic.

The adjustment of the SiO_2 is one of the most important features in the calculation of the norm. The general principle followed involves a recognition of the so-called affinity of the different bases for SiO_2 and of the relative proportions of SiO_2 to base which each base can bind.¹ The order of affinity for SiO_2 , by which the distribution of this constituent is determined in calculating the norm, is as follows:



It should be noted that this order is not arbitrarily chosen but is founded on experience in petrography and mineralogy, supported by laboratory experiment, and that it accords in general with the occurrence of minerals in igneous rocks.

Stress must also be laid on the fact that the so-called standard minerals are understood to be *molecules* and not actual minerals. The misappreciation of this point has apparently led to some confusion of mind in regard to the norm.

NORMATIVE MINERAL MOLECULES.

Salic group.

Quartz (Q).....	SiO_2 .
Corundum (C).....	Al_2O_3 .
Zircon (Z).....	$ZrO_2 \cdot SiO_2$.
Orthoclase (or).....	$K_2O \cdot Al_2O_3 \cdot 6SiO_2$.
Albite (ab).....	$Na_2O \cdot Al_2O_3 \cdot 6SiO_2$.
Anorthite (an).....	$CaO \cdot Al_2O_3 \cdot 2SiO_2$.
Leucite (lc).....	$K_2O \cdot Al_2O_3 \cdot 4SiO_2$.
Nephelite (ne).....	$Na_2O \cdot Al_2O_3 \cdot 2SiO_2$.
Kaliophilite (kp).....	$K_2O \cdot Al_2O_3 \cdot 2SiO_2$.
Halite (hl).....	$NaCl$.
Thenardite (th).....	$Na_2O \cdot SO_3$.
Sodium carbonate (nc).....	$Na_2O \cdot CO_2$.

Femic group.

Acmite (ac).....	$Na_2O \cdot Fe_2O_3 \cdot 4SiO_2$.
Sodium metasilicate (ns).....	$Na_2O \cdot SiO_2$.
Potassium metasilicate (ks).....	$K_2O \cdot SiO_2$.
Diopside (di).....	$CaO(Mg, Fe)O \cdot 2SiO_2$.
Wollastonite (wo).....	$CaO \cdot SiO_2$.
Hypersthene (hy).....	$(Mg, Fe)O \cdot SiO_2$.
Olivine (ol).....	$2(Mg, Fe)O \cdot SiO_2$.
Calcium orthosilicate (cs).....	$2CaO \cdot SiO_2$.
Magnetite (mt).....	$FeO \cdot Fe_2O_3$.
Chromite (cm).....	$FeO \cdot Cr_2O_3$.
Ilmenite (il).....	$FeO \cdot TiO_2$.
Hematite (hm).....	Fe_2O_3 .
Titanite (tn).....	$CaO \cdot TiO_2 \cdot SiO_2$.
Peroiskite (pi).....	$CaO \cdot TiO_2$.
Rutile (ru).....	TiO_2 .
Apatite (ap).....	$3(CaO \cdot P_2O_5) \cdot CaF_2$.
Fluorite.....	CaF_2 .
Pyrite (pr).....	FeS_2 .
Calcite (cc).....	$CaO \cdot CO_2$.

¹ Cf. Cross, Whitman, Iddings, J. P., Pirsson, L. V., Washington, H. S., The quantitative classification of igneous rocks, p. 191. Whether the order of this affinity is determined by something analogous to "chemical affinity" or is due to differences in solubility need not be discussed here. A general discussion of this subject and of the norm will form the subject of a separate paper.

Of these molecules quartz, corundum, sodium and potassium metasilicates, hematite, and rutile are what may be called "excess" molecules, as each represents an excess of some constituent over the amount which may be used to form other constituents.

THE CALCULATION.

The following statement of the rules for calculating the norm is based on the original presentation, but is modified in substance to accord with certain suggested minor changes and is modified in form so far as to represent the procedure adopted by me in calculating the norms found in Part I of the tables. In the description the word "amount" should always be understood to mean the molecular amount or the molecular number obtained by dividing the percentage weight of the constituent by its molecular weight.

1. The molecular number (amount) of each constituent is determined by reference to the table of molecular numbers, given on pages 1166-1170. If the result is less than 0.002 it may be neglected.

2. The amounts of MnO and NiO are to be added to that of FeO , and those of BaO and SrO to that of CaO .

The minor fixed molecules are first to be disposed of. The order in which this is done (3a-3i) is generally immaterial.

3a. An amount of CaO equal to 3.33 that of the P_2O_5 is allotted for apatite.

3b. An amount of Na_2O equal to that of the Cl_2 is allotted for halite.

3c. An amount of Na_2O equal to that of the SO_3 is allotted for thenardite. It must be remembered here that the SO_3 stated in the analysis often really represents the S of pyrite, so that rule 3c is applicable only when the rock contains minerals of the hauyne group.

3d. An amount of FeO equal to half that of S (or the S of erroneously stated SO_3 as above) is allotted for pyrite.

3e. An amount of FeO equal to that of the Cr_2O_3 is allotted for chromite.

3f. An amount of FeO equal to that of the TiO_2 is allotted for ilmenite. If there is an excess of TiO_2 an equal amount of CaO is to be allotted to it for provisional titanite, but only after the allotment of CaO to Al_2O_3 for anorthite (Rule 4d). If there is still an excess of TiO_2 it is calculated as rutile.

3g. An amount of CaO equal to half that of the F in excess of what is needed for apatite (that is, the 0.33 of CaO of 3a) is allotted for fluorite.

3h. If the rock is not decomposed and contains cancrinite, an amount of Na_2O equal to that of the CO_2 is allotted for sodium carbonate, which is to be considered as salic.¹ If the rock contains calcite, an amount of CaO equal to that of the CO_2 is allotted for calcite. If the modal calcite is primary, this normative calcite molecule is to be regarded as femic;

¹ This is a recent modification, see p. 31.

if the modal calcite is secondary or due to the assimilation of limestone, the calculated calcite molecule is to be disregarded as not forming part of the norm.

3i. An amount of SiO_2 equal to that of the ZrO_2 is allotted for zircon.

Of the allotments under Rule 3, only a and f are generally and b, c, and i occasionally necessary; the others are rarely called for.

4a. An amount of Al_2O_3 equal to that of the K_2O is allotted for provisional orthoclase.

4b. If there is an excess of K_2O over Al_2O_3 (an excess extremely rare), it is calculated as potassium metasilicate. For the Na_2O see Rules 5a and 5b.

4c. An excess of Al_2O_3 over the K_2O is allotted to an equal amount of remaining Na_2O for provisional albite. If there is insufficient Al_2O_3 , see Rule 4g.

4d. If there is an excess of Al_2O_3 over the $\text{K}_2\text{O} + \text{Na}_2\text{O}$ it is allotted to an equal amount of remaining CaO for anorthite.

4e. If there is an excess of Al_2O_3 over this CaO it is calculated as corundum.

4f. If there is an excess of CaO over this Al_2O_3 of 4d it is feric and reserved for diopside and wollastonite. (See Rules 7a and 7b.)

4g. If in 4c there is an excess of Na_2O over Al_2O_3 it is to be reserved for acmite and possibly for sodium metasilicate. (See Rules 5a and 5b.) There is then no anorthite in the norm.

5a. An amount of Fe_2O_3 equal to that of the excess of Na_2O over Al_2O_3 (see Rule 4g) is allotted to acmite.

5b. If there is still an excess of Na_2O over Fe_2O_3 (a rare excess) it is calculated as sodium metasilicate.

5c. If, as usually happens, there is an excess of Fe_2O_3 over Na_2O it is assigned to magnetite, an equal amount of FeO being allotted to it out of what remains from the formation of pyrite, chromite, and ilmenite. (See Rules 3d, 3e, 3f.)

5d. If there is still an excess of Fe_2O_3 it is calculated as hematite.

6. All the MgO and the FeO remaining from the previous allotments (see Rules 3d, 3e, 3f, and 5c) are added together and their relative proportions are ascertained (most easily by the use of a slide rule).

7a. To the amount of CaO from 4d is allotted provisionally an equal amount of $\text{MgO} + \text{FeO}$ to form diopside, the relative proportions of these two being preserved.

7b. If there is an excess of CaO it is reserved for provisional wollastonite.

7c. If there is an excess of $\text{MgO} + \text{FeO}$ over that needed for diopside (7a) it is reserved for provisional hypersthene.

All the oxides except SiO_2 have now been assigned to actual or provisional mineral molecules and we have next to consider the distribution of the silica.

8a. The sum of the amounts of silica needed to form zircon from ZrO_2 (Rule 3i, 1:1), titanite from CaO

(Rule 3f, 1:1), acmite from excess Na_2O (Rule 5a, 4:1), potassium and sodium metasilicates from excess K_2O and Na_2O (Rules 4b, 5b, 1:1), and *provisional* orthoclase from K_2O (Rule 4a, 6:1), albite from Na_2O (Rule 4c, 6:1), anorthite from CaO (Rule 4d, 2:1), diopside from $\text{CaO} + (\text{Mg}, \text{Fe})\text{O}$ (Rule 7a, 1:1), wollastonite from excess CaO (Rule 7b, 1:1), and hypersthene from $(\text{Mg}, \text{Fe})\text{O}$ (Rule 7c, 1:1) is subtracted from the total SiO_2 .

8b. If there is an excess of SiO_2 , as there commonly is, it is calculated as quartz.

8c. If there is a deficiency of silica in 8a the SiO_2 allotted to hypersthene (Rule 7c) is subtracted from the general sum of 8a and the remainder subtracted from the total SiO_2 . If there is here an excess of SiO_2 it is allotted to the $(\text{Mg}, \text{Fe})\text{O}$ of 7c to form hypersthene and olivine, and is distributed according to equations (1) and (2):

Let x = the number of hypersthene molecules and y = the number of olivine molecules, then—

(1) $x + y$ = the amount of available $(\text{Mg}, \text{Fe})\text{O}$ and

(2) $x + \frac{y}{2}$ = the amount of available SiO_2 .

In this operation the relative proportion of MgO and FeO determined in 6 and used in forming diopside (Rule 7a) is to be preserved. The fixed and provisional molecules of Rule 8a are calculated into their percentage weights. If there is not enough silica to equal half the amount of $(\text{Mg}, \text{Fe})\text{O}$ of Rule 7c, all the $(\text{Mg}, \text{Fe})\text{O}$ of Rule 7c is calculated as olivine, SiO_2 equal to half its amount being assigned to it.

8d. If there is a deficiency of SiO_2 in 8c, the SiO_2 allotted to titanite (3f) is subtracted from the general sum of 8a, and the $\text{CaO} + \text{TiO}_2$ calculated as perovskite.

To follow strictly the order of affinity for SiO_2 stated on page 1163 we should now distribute SiO_2 between wollastonite and calcium orthosilicate, but as calcium orthosilicate is represented modally—that is, among actual minerals—in igneous rocks only in the very rare melilite, which also always occurs in rocks containing little SiO_2 and abundant nephelite, little albite, and often considerable leucite, we next take up the distribution of SiO_2 between albite and nephelite as representing most closely the facts of actual mineral occurrence.

8e. The sum of the SiO_2 needed to form the molecules of 8a is deducted from the total SiO_2 , except that olivine is substituted for hypersthene, and perovskite for titanite, and that albite is not included. If there is an excess of more than twice (and, of course, less than six times) that of the Na_2O for the provisional albite of 8a this is distributed between albite and nephelite according to equations (3) and (4):

Let x = the number of albite molecules and y = the number of nephelite molecules, then—

(3) $x + y$ = the amount of available Na_2O , and

(4) $6x + 2y$ = the amount of available SiO_2 .

8f. If there is still a deficiency of SiO_2 —that is, in 8e, not enough to equal twice the amount of available Na_2O —all this Na_2O is allotted to nephelite and the K_2O is distributed between orthoclase and leucite, as follows: The sum of the SiO_2 needed for the molecules in 8a is subtracted from the total SiO_2 , olivine being substituted for hypersthene, perovskite for titanite, and nephelite for albite, and orthoclase being disregarded. If there is an excess of more than four times (and, of course, less than six times) that of K_2O it is distributed between orthoclase and leucite according to equations (5) and (6):

Let x = the number of orthoclase molecules and y = the number of leucite molecules, then—

$$(5) \ x + y = \text{the amount of available } \text{K}_2\text{O, and}$$

$$(6) \ 6x + 4y = \text{the amount of available } \text{SiO}_2.$$

8g. If there is still a deficiency of SiO_2 —that is, in 8f not enough to equal four times the amount of K_2O —we have to distribute the CaO of wollastonite and diopside between these two and calcium orthosilicate, and the $(\text{Mg}, \text{Fe})\text{O}$ of diopside between diopside and olivine, according to the available SiO_2 . This distribution is made as shown below.¹ There are two possible cases; either there is sufficient wollastonite to reduce to orthosilicate or there is not.

The most frequent case is that in which there is no wollastonite or its amount is insufficient to satisfy the deficiency in SiO_2 . Here, after allotting SiO_2 to form leucite, nephelite, anorthite, aemite, olivine of rule 8c, and possibly zircon and sodium metasilicate, the amount thus used is deducted from the total SiO_2 , the residue being the "available silica." Letting d = the number of new diopside molecules, f = the number of new olivine molecules, and c = the number of calcium orthosilicate molecules, we have the equations—

$$(7) \ 2d + f + c = \text{the amount of available } \text{SiO}_2.$$

$$(8) \ d + 2f = \text{the amount of } (\text{Mg}, \text{Fe})\text{O (of provisional diopside)}.$$

$$(9) \ d + 2c = \text{the amount of } \text{CaO} \text{ of provisional diopside and wollastonite.}$$

These equations can be solved, of course, in several ways, but that which I have adopted is as follows: Subtracting (7) from the sum of (8) and (9) we get the value of $f + c$; substituting this in (7) d is found, and then from (8) and (9) f and c are found successively.

In the second case, where there is sufficient tentative wollastonite to meet the deficiency of SiO_2 , the total amount of SiO_2 in the rock is subtracted from the sum of the SiO_2 which has been allotted to leucite, nephelite, anorthite, aemite, diopside, olivine, and to tentative wollastonite. The deficit is the number of molecules of necessary calcium orthosilicate, and also the amount of SiO_2 to be assigned to it. This requires twice as much CaO . The rest of the CaO remains in wollastonite and takes an equal amount of SiO_2 , while the diopside remains unchanged.

8h. If, as may very rarely happen, there is not even enough SiO_2 to form leucite, we must assume the presence of the kaliophilite molecule in the norm and distribute the K_2O between this and leucite. For this the sum of the SiO_2 needed for nephelite, anorthite, aemite, sodium metasilicate, olivine, calcium orthosilicate, and zircon is subtracted from the total SiO_2 , and the amounts of leucite and kaliophilite are calculated according to the following equations (10) and (11):

Let x = the number of leucite molecules and y = the number of kaliophilite molecules, then—

$$(10) \ x + y = \text{the amount of } \text{K}_2\text{O, and}$$

$$(11) \ 4x + 2y = \text{the amount of available } \text{SiO}_2.$$

9. Having thus adjusted the amounts of the SiO_2 , and all the other constituents between the fixed molecules and those with differing ratios of SiO_2 (the provisional becoming actual molecules), they are calculated into the percentage weights of the mineral molecules of the norm by the use of the tables on pages 1172-1180.

¹ Washington, H. S., Wash. Acad. Sci. Jour., vol. 5, p. 346, 1915.

APPENDIX 4.

MOLECULAR NUMBERS OF CHEMICAL COMPONENTS OF ROCKS.

SILICA, SiO_2 (MOLECULAR WEIGHT, 60).

(Divide percentage weight by 60.)

ALUMINA, Al_2O_3 (MOLECULAR WEIGHT, 102).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0
1	.010	.011	.012	.013	.014	.015	.016	.017	.018	.019	1
2	.020	.021	.022	.023	.024	.025	.026	.027	.028	.029	2
3	.039	.030	.031	.032	.033	.034	.035	.036	.037	.038	3
4	.039	.040	.041	.042	.043	.044	.045	.046	.047	.048	4
5	.049	.050	.051	.052	.053	.054	.055	.056	.057	.058	5
6	.059	.060	.061	.062	.063	.064	.065	.066	.067	.068	6
7	.069	.070	.071	.072	.073	.074	.075	.076	.077	.078	7
8	.078	.079	.080	.081	.082	.083	.084	.085	.086	.087	8
9	.088	.089	.090	.091	.092	.093	.094	.095	.096	.097	9
10	.098	.099	.100	.101	.102	.103	.104	.105	.106	.107	10
11	.108	.109	.110	.111	.112	.113	.114	.115	.116	.117	11
12	.118	.119	.120	.121	.122	.123	.124	.125	.126	.127	12
13	.127	.128	.129	.130	.131	.132	.133	.134	.135	.136	13
14	.137	.138	.139	.140	.141	.142	.143	.144	.145	.146	14
15	.147	.148	.149	.150	.151	.152	.153	.154	.155	.156	15
16	.157	.158	.159	.160	.161	.162	.163	.164	.165	.166	16
17	.167	.168	.169	.170	.171	.172	.173	.174	.175	.176	17
18	.176	.177	.178	.179	.180	.181	.182	.183	.184	.185	18
19	.186	.187	.188	.189	.190	.191	.192	.193	.194	.195	19
20	.196	.197	.198	.199	.200	.201	.202	.203	.204	.205	20
21	.206	.207	.208	.209	.210	.211	.212	.213	.214	.215	21
22	.216	.217	.218	.219	.220	.221	.222	.223	.224	.225	22
23	.225	.226	.227	.228	.229	.230	.231	.232	.233	.234	23
24	.235	.236	.237	.238	.239	.240	.241	.242	.243	.244	24
25	.245	.246	.247	.248	.249	.250	.250	.252	.253	.254	25
26	.255	.256	.257	.258	.259	.260	.261	.262	.263	.264	26
27	.265	.266	.267	.268	.269	.270	.271	.272	.273	.274	27
28	.275	.275	.276	.277	.278	.279	.280	.281	.282	.283	28
29	.284	.285	.286	.287	.288	.289	.290	.291	.292	.293	29

FERRIC OXIDE, Fe_2O_3 (MOLECULAR WEIGHT, 160).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.001	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0
1	.006	.007	.008	.008	.009	.009	.010	.011	.011	.012	1
2	.013	.013	.014	.014	.015	.016	.016	.017	.018	.018	2
3	.019	.019	.020	.021	.021	.022	.023	.023	.024	.024	3
4	.025	.026	.026	.027	.028	.028	.029	.029	.030	.031	4
5	.031	.032	.033	.033	.034	.034	.035	.036	.036	.037	5
6	.038	.038	.039	.039	.040	.041	.041	.042	.043	.043	6
7	.044	.044	.045	.046	.046	.047	.048	.048	.049	.049	7
8	.050	.051	.051	.052	.053	.053	.054	.054	.055	.056	8
9	.056	.057	.058	.058	.059	.059	.060	.061	.061	.062	9
10	.063	.063	.064	.064	.065	.066	.066	.067	.068	.068	10
11	.069	.069	.070	.071	.071	.072	.073	.073	.074	.074	11
12	.075	.076	.076	.077	.078	.078	.079	.079	.080	.081	12
13	.081	.082	.083	.083	.084	.084	.085	.086	.086	.087	13
14	.088	.088	.089	.089	.090	.091	.091	.092	.093	.093	14
15	.094	.094	.095	.096	.096	.097	.098	.098	.099	.099	15
16	.100	.101	.101	.102	.103	.103	.104	.104	.105	.106	16
17	.106	.107	.108	.108	.109	.109	.110	.111	.111	.112	17
18	.113	.113	.114	.114	.115	.116	.116	.117	.118	.118	18
19	.119	.119	.120	.121	.121	.122	.123	.123	.124	.124	19

MOLECULAR NUMBERS OF CHEMICAL COMPONENTS OF ROCKS.

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FERROUS OXIDE, FeO (MOLECULAR WEIGHT, 72).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.003	0.004	0.006	0.007	0.008	0.010	0.011	0.013	0
1	.014	.015	.017	.018	.019	.021	.022	.024	.025	.026	1
2	.028	.029	.031	.032	.033	.035	.036	.038	.039	.040	2
3	.042	.043	.044	.046	.047	.049	.050	.051	.053	.054	3
4	.056	.057	.058	.060	.061	.063	.064	.065	.067	.068	4
5	.069	.071	.072	.074	.075	.076	.078	.079	.081	.082	5
6	.083	.085	.086	.088	.089	.090	.092	.093	.094	.096	6
7	.097	.099	.100	.101	.103	.104	.106	.107	.108	.110	7
8	.111	.113	.114	.115	.117	.118	.119	.121	.122	.124	8
9	.125	.126	.128	.129	.131	.132	.133	.135	.136	.138	9
10	.139	.140	.142	.143	.144	.146	.147	.149	.150	.151	10
11	.153	.154	.156	.157	.158	.160	.161	.163	.164	.165	11
12	.167	.168	.169	.171	.172	.174	.175	.176	.178	.179	12
13	.181	.182	.183	.185	.186	.188	.189	.190	.192	.193	13
14	.194	.196	.197	.199	.200	.201	.203	.204	.206	.207	14
15	.208	.210	.211	.213	.214	.215	.217	.218	.219	.221	15
16	.222	.224	.225	.226	.228	.229	.231	.232	.233	.235	16
17	.236	.238	.239	.240	.242	.243	.244	.246	.247	.249	17
18	.250	.251	.253	.254	.256	.257	.258	.260	.261	.263	18
19	.264	.265	.267	.268	.269	.271	.272	.274	.275	.276	19

MAGNESIA, MgO (MOLECULAR WEIGHT, 40).

(Divide percentage weight by 40.)

LIME, CaO (MOLECULAR WEIGHT, 56).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.002	0.004	0.005	0.007	0.009	0.011	0.013	0.014	0.016	0
1	.018	.020	.021	.023	.025	.027	.029	.030	.032	.034	1
2	.036	.038	.039	.041	.043	.045	.046	.048	.050	.052	2
3	.054	.055	.057	.059	.061	.063	.064	.066	.068	.070	3
4	.071	.073	.075	.077	.079	.080	.082	.084	.086	.088	4
5	.089	.091	.093	.095	.096	.098	.100	.102	.104	.105	5
6	.107	.109	.111	.113	.114	.116	.118	.120	.121	.123	6
7	.125	.127	.129	.130	.132	.134	.136	.138	.139	.141	7
8	.143	.145	.146	.148	.150	.152	.154	.155	.157	.159	8
9	.161	.163	.164	.166	.168	.170	.171	.173	.175	.177	9
10	.179	.180	.182	.184	.186	.188	.189	.191	.193	.195	10
11	.196	.198	.200	.202	.204	.205	.207	.209	.211	.213	11
12	.214	.216	.218	.220	.221	.223	.225	.227	.229	.230	12
13	.232	.234	.236	.238	.239	.241	.243	.245	.246	.248	13
14	.250	.252	.254	.255	.257	.259	.261	.263	.264	.266	14
15	.268	.270	.271	.273	.275	.277	.279	.280	.282	.284	15
16	.286	.288	.289	.291	.293	.295	.296	.298	.300	.302	16
17	.304	.305	.307	.309	.311	.313	.314	.316	.318	.320	17
18	.321	.323	.325	.327	.329	.330	.332	.334	.336	.338	18
19	.339	.341	.343	.345	.346	.348	.350	.352	.354	.355	19
20	.357	.358	.360	.362	.364	.366	.367	.369	.371	.373	20
21	.375	.376	.378	.380	.382	.383	.385	.387	.389	.391	21
22	.392	.394	.396	.398	.400	.401	.403	.405	.407	.408	22
23	.410	.412	.414	.416	.417	.419	.421	.423	.425	.426	23
24	.428	.430	.432	.433	.435	.437	.439	.441	.442	.444	24

SODA, Na₂O (MOLECULAR WEIGHT, 62).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.002	0.003	0.005	0.006	0.008	0.010	0.011	0.013	0.015	0
1	.016	.018	.019	.021	.023	.024	.026	.027	.029	.031	1
2	.032	.034	.035	.037	.039	.040	.042	.044	.045	.047	2
3	.048	.050	.052	.053	.055	.056	.058	.060	.061	.063	3
4	.065	.066	.068	.069	.071	.073	.074	.076	.077	.079	4
5	.081	.082	.084	.085	.087	.089	.090	.092	.094	.095	5
6	.097	.098	.100	.102	.103	.105	.106	.108	.110	.111	6
7	.113	.115	.116	.118	.119	.121	.123	.124	.126	.127	7
8	.129	.131	.132	.134	.135	.137	.139	.140	.142	.144	8
9	.145	.147	.148	.150	.152	.153	.155	.156	.158	.160	9
10	.161	.163	.165	.166	.168	.169	.171	.173	.174	.176	10
11	.177	.179	.181	.182	.184	.185	.187	.189	.190	.192	11
12	.194	.195	.197	.198	.200	.202	.203	.205	.206	.208	12
13	.210	.211	.213	.215	.216	.218	.219	.221	.223	.224	13
14	.226	.227	.229	.231	.232	.234	.235	.237	.239	.240	14
15	.242	.244	.245	.247	.248	.250	.252	.253	.255	.256	15
16	.258	.260	.261	.263	.265	.266	.268	.269	.271	.273	16
17	.274	.276	.277	.279	.281	.282	.284	.285	.287	.289	17
18	.290	.292	.294	.295	.297	.298	.300	.302	.303	.305	18
19	.306	.308	.310	.311	.313	.315	.316	.318	.319	.321	19

POTASH, K₂O (MOLECULAR WEIGHT, 94).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.009	0.010	0
1	.011	.012	.013	.014	.015	.016	.017	.018	.019	.020	1
2	.021	.022	.023	.024	.026	.027	.028	.029	.030	.031	2
3	.032	.033	.034	.035	.036	.037	.038	.039	.040	.041	3
4	.043	.044	.045	.046	.047	.048	.049	.050	.051	.052	4
5	.053	.054	.055	.056	.057	.059	.060	.061	.062	.063	5
6	.064	.065	.066	.067	.068	.069	.070	.071	.072	.073	6
7	.074	.076	.077	.078	.079	.080	.081	.082	.083	.084	7
8	.085	.086	.087	.088	.089	.090	.091	.093	.094	.095	8
9	.096	.097	.098	.099	.100	.101	.102	.103	.104	.105	9
10	.106	.107	.109	.110	.111	.112	.113	.114	.115	.116	10
11	.117	.118	.119	.120	.121	.122	.123	.124	.126	.127	11
12	.128	.129	.130	.131	.132	.133	.134	.135	.136	.137	12
13	.138	.139	.140	.141	.143	.144	.145	.146	.147	.148	13
14	.149	.150	.151	.152	.153	.154	.155	.156	.157	.159	14

TITANIUM DIOXIDE, TiO₂ (MOLECULAR WEIGHT, 80).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.003	0.004	0.005	0.006	0.008	0.009	0.010	0.011	0
1	.013	.014	.015	.016	.018	.019	.020	.021	.023	.024	1
2	.025	.026	.028	.029	.030	.031	.033	.034	.035	.036	2
3	.038	.039	.040	.041	.043	.044	.045	.046	.048	.049	3
4	.050	.051	.053	.054	.055	.056	.058	.059	.060	.061	4
5	.063	.064	.065	.066	.068	.069	.070	.071	.073	.074	5
6	.075	.076	.078	.079	.080	.081	.083	.084	.085	.086	6
7	.088	.089	.090	.091	.093	.094	.095	.096	.098	.099	7
8	.100	.101	.103	.104	.105	.106	.108	.109	.110	.111	8
9	.113	.114	.115	.116	.118	.119	.120	.121	.123	.124	9

PHOSPHORIC PENTOXIDE, P₂O₅ (MOLECULAR WEIGHT, 142).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.001	0.002	0.003	0.004	0.004	0.005	0.006	0.006	0
1	.007	.008	.008	.009	.010	.011	.011	.012	.013	.013	1
2	.014	.015	.015	.016	.017	.018	.018	.019	.020	.020	2
3	.021	.022	.023	.023	.024	.025	.025	.026	.027	.027	3
4	.028	.029	.030	.030	.031	.032	.032	.033	.034	.035	4
5	.035	.036	.037	.037	.038	.039	.039	.040	.041	.042	5

MANGANOUS OXIDE, MnO (MOLECULAR WEIGHT, 71).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.003	0.004	0.006	0.007	0.008	0.010	0.011	0.013	0
1	.014	.015	.017	.018	.020	.021	.023	.024	.025	.027	1
2	.028	.030	.031	.032	.034	.035	.037	.038	.039	.041	2
3	.042	.044	.045	.046	.048	.049	.051	.052	.054	.055	3

ZIRCONIA, ZrO_2 (MOLECULAR WEIGHT, 123).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.007	0.007	0
1	.008	.009	.010	.011	.011	.012	.013	.014	.015	.015	1
2	.016	.017	.018	.019	.020	.021	.021	.022	.023	.024	2
3	.024	.025	.026	.027	.028	.028	.029	.030	.031	.032	3
4	.033	.033	.034	.035	.036	.037	.037	.038	.039	.040	4
5	.041	.042	.042	.043	.044	.045	.046	.046	.047	.048	5

CARBON DIOXIDE, CO_2 (MOLECULAR WEIGHT, 44).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.002	0.005	0.007	0.009	0.011	0.014	0.016	0.018	0.020	0
1	.023	.025	.027	.030	.032	.034	.036	.039	.041	.043	1
2	.045	.048	.050	.052	.055	.057	.059	.061	.064	.066	2
3	.068	.070	.073	.075	.077	.080	.082	.084	.086	.089	3
4	.091	.093	.095	.098	.100	.102	.105	.107	.109	.111	4
5	.114	.116	.118	.120	.123	.125	.127	.130	.132	.134	5
6	.136	.139	.141	.143	.145	.148	.150	.152	.155	.157	6
7	.159	.161	.164	.166	.168	.170	.173	.175	.177	.180	7
8	.182	.184	.186	.189	.191	.193	.195	.198	.200	.202	8
9	.205	.207	.209	.211	.214	.216	.218	.220	.223	.225	9

SULPHUR TRIOXIDE, SO_3 (MOLECULAR WEIGHT, 80).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.003	0.004	0.005	0.006	0.008	0.009	0.010	0.011	0
1	.013	.014	.015	.016	.018	.019	.020	.021	.023	.024	1
2	.025	.026	.028	.029	.030	.031	.033	.034	.035	.036	2
3	.038	.039	.040	.041	.043	.044	.045	.046	.048	.049	3
4	.050	.051	.053	.054	.055	.056	.058	.059	.060	.061	4

CHLORINE, Cl_2 (MOLECULAR WEIGHT, 71).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.003	0.004	0.006	0.007	0.008	0.010	0.011	0.013	0
1	.014	.015	.017	.018	.020	.021	.023	.024	.025	.027	1
2	.028	.030	.031	.032	.034	.035	.037	.038	.039	.041	2
3	.042	.044	.045	.046	.048	.049	.051	.052	.054	.055	3

FLUORINE, F_2 (MOLECULAR WEIGHT, 38).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.003	0.005	0.008	0.010	0.013	0.016	0.018	0.021	0.024	0
1	.026	.029	.031	.034	.037	.039	.042	.045	.047	.050	1

SULPHUR, S (ATOMIC WEIGHT, 32).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.003	0.006	0.009	0.013	0.016	0.019	0.022	0.025	0.028	0
1	.031	.034	.038	.041	.044	.047	.050	.053	.056	.059	1
2	.063	.066	.069	.072	.075	.078	.081	.084	.088	.091	2
3	.094	.097	.100	.103	.106	.109	.113	.116	.119	.122	3
4	.125	.128	.131	.134	.138	.141	.144	.147	.150	.153	4
5	.156	.159	.163	.166	.169	.172	.175	.178	.181	.184	5

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

CHROMIC OXIDE, Cr₂O₃ (MOLECULAR WEIGHT, 152).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.001	0.002	0.003	0.003	0.004	0.005	0.005	0.006	0
1	.007	.007	.008	.009	.009	.010	.011	.011	.012	.013	1
2	.013	.014	.014	.015	.016	.016	.017	.018	.018	.019	2
3	.020	.020	.021	.022	.022	.023	.024	.024	.025	.026	3
4	.026	.027	.028	.028	.029	.030	.030	.031	.032	.032	4
5	.033	.034	.034	.035	.036	.036	.037	.038	.038	.039	5

NICKEL OXIDE, NiO (MOLECULAR WEIGHT, 75).

COBALT OXIDE, CoO (MOLECULAR WEIGHT, 75).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.003	0.004	0.005	0.007	0.008	0.009	0.011	0.012	0
1	.013	.015	.016	.017	.019	.020	.021	.023	.024	.025	1
2	.027	.028	.029	.031	.033	.033	.035	.036	.037	.039	2
3	.040	.041	.043	.044	.045	.047	.048	.049	.051	.052	3

BARYTA, BaO (MOLECULAR WEIGHT, 153.5).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.001	0.002	0.003	0.003	0.004	0.005	0.005	0.006	0
1	.007	.007	.008	.009	.009	.010	.010	.011	.012	.012	1
2	.013	.014	.014	.015	.016	.016	.017	.018	.018	.019	2
3	.020	.020	.021	.022	.022	.023	.024	.024	.025	.026	3

STRONTIA, SrO (MOLECULAR WEIGHT, 103.5).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0
1	.010	.011	.012	.013	.014	.014	.015	.016	.017	.018	1

LITHIA, Li₂O (MOLECULAR WEIGHT, 30).

Per ct.	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Per ct.
0	0.000	0.003	0.007	0.010	0.013	0.017	0.020	0.023	0.027	0.030	0
1	.033	.037	.040	.043	.047	.050	.053	.057	.060	.063	1

APPENDIX 5.

PERCENTAGE WEIGHTS FOR NUMBERS OF MOLECULES OF THE NORMATIVE MINERALS.

QUARTZ, SiO_2 (MOLECULAR WEIGHT, 60).

(Multiply the molecular number of SiO_2 by 60.)

ORTHOCLASE, $\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$ (MOLECULAR WEIGHT, 556).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.56	1.11	1.67	2.22	2.78	3.34	3.89	4.45	5.00	0.00
.01	5.56	6.12	6.67	7.23	7.78	8.34	8.90	9.45	10.01	10.56	.01
.02	11.12	11.68	12.23	12.79	13.34	13.90	14.46	15.01	15.57	16.12	.02
.03	16.68	17.24	17.79	18.35	18.90	19.46	20.02	20.57	21.13	21.68	.03
.04	22.24	22.80	23.35	23.91	24.46	25.02	25.58	26.13	26.69	27.24	.04
.05	27.80	28.36	28.91	29.47	30.02	30.58	31.14	31.69	32.25	32.80	.05
.06	33.36	33.92	34.47	35.03	35.58	36.14	36.70	37.25	37.81	38.36	.06
.07	38.92	39.48	40.03	40.59	41.14	41.70	42.26	42.81	43.37	43.92	.07
.08	44.48	45.04	45.59	46.15	46.70	47.26	47.82	48.37	48.93	49.48	.08
.09	50.04	50.60	51.15	51.71	52.26	52.82	53.38	53.93	54.49	55.04	.09
.10	55.60	56.16	56.71	57.27	57.82	58.38	58.94	59.49	60.05	60.60	.10
.11	61.16	61.72	62.27	62.83	63.38	63.94	64.50	65.05	65.61	66.16	.11
.12	66.72	67.28	67.83	68.39	68.94	69.50	70.06	70.61	71.17	71.72	.12
.13	72.28	72.84	73.39	73.95	74.50	75.06	75.62	76.17	76.73	77.28	.13
.14	77.84	78.40	78.95	79.51	80.06	80.62	81.18	81.73	82.29	82.84	.14
.15	83.40	83.96	84.51	85.07	85.62	86.18	86.74	87.39	87.85	88.40	.15
.16	88.96	89.52	90.07	90.63	91.18	91.74	92.30	92.85	93.41	93.96	.16
.17	94.52	95.08	95.63	96.19	96.74	97.30	97.85	98.41	98.97	99.52	.17

ALBITE, $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$ (MOLECULAR WEIGHT, 524).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.52	1.05	1.57	2.10	2.62	3.14	3.67	4.19	4.72	0.00
.01	5.24	5.76	6.29	6.81	7.34	7.86	8.38	8.91	9.43	9.96	.01
.02	10.48	11.00	11.53	12.05	12.58	13.10	13.62	14.15	14.67	15.20	.02
.03	15.72	16.24	16.77	17.29	17.82	18.34	18.86	19.39	19.91	20.44	.03
.04	20.96	21.48	22.01	22.53	23.06	23.58	24.10	24.63	25.15	25.68	.04
.05	26.20	26.72	27.25	27.77	28.30	28.82	29.34	29.87	30.39	30.92	.05
.06	31.44	31.96	32.49	33.01	33.54	34.06	34.58	35.11	35.63	36.15	.06
.07	36.68	37.20	37.73	38.25	38.77	39.30	39.82	40.35	40.87	41.39	.07
.08	41.92	42.44	42.97	43.49	44.01	44.54	45.06	45.59	46.11	46.63	.08
.09	47.16	47.68	48.21	48.73	49.25	49.78	50.30	50.83	51.35	51.87	.09
.10	52.40	52.92	53.45	53.97	54.49	55.02	55.54	56.07	56.59	57.11	.10
.11	57.64	58.16	58.69	59.21	59.73	60.26	60.78	61.31	61.83	62.35	.11
.12	62.88	63.40	63.93	64.45	64.97	65.50	66.02	66.55	67.07	67.59	.12
.13	68.12	68.64	69.17	69.69	70.21	70.74	71.26	71.79	72.31	72.83	.13
.14	73.36	73.88	74.41	75.93	75.45	76.98	76.50	77.03	77.55	78.07	.14
.15	78.60	79.12	79.65	80.17	80.70	81.22	81.72	82.28	82.79	83.32	.15
.16	83.81	84.36	84.89	85.41	85.94	86.46	86.98	87.51	88.03	88.56	.16
.17	89.08	89.60	90.13	90.65	91.18	91.70	92.22	92.75	93.27	93.80	.17
.18	94.32	94.84	95.37	95.89	96.42	96.94	97.46	97.99	98.51	99.04	.18

ANORTHITE, $\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ (MOLECULAR WEIGHT, 278).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.28	0.56	0.83	1.11	1.39	1.67	1.95	2.22	2.50	0.00
.01	2.78	3.06	3.34	3.61	3.89	4.17	4.45	4.73	5.00	5.28	.01
.02	5.56	5.84	6.12	6.39	6.67	6.95	7.23	7.51	7.78	8.06	.02
.03	8.34	8.62	8.90	9.17	9.45	9.73	10.01	10.29	10.56	10.84	.03
.04	11.12	11.40	11.68	11.95	12.23	12.51	12.79	13.07	13.34	13.62	.04
.05	13.90	14.18	14.46	14.73	15.01	15.29	15.57	15.85	16.12	16.40	.05
.06	16.68	16.96	17.24	17.51	17.79	18.07	18.35	18.63	18.90	19.18	.06
.07	19.46	19.74	20.02	20.29	20.57	20.85	21.13	21.41	21.68	21.96	.07
.08	22.24	22.52	22.80	23.07	23.35	23.63	23.91	24.19	24.46	24.74	.08
.09	25.02	25.30	25.58	25.85	26.13	26.41	26.69	26.97	27.24	27.52	.09
.10	27.80	28.08	28.36	28.63	28.91	29.19	29.47	29.75	30.02	30.30	.10
.11	30.58	30.86	31.14	31.41	31.69	31.97	32.25	32.53	32.80	33.08	.11
.12	33.36	33.64	33.92	34.19	34.47	34.75	35.03	35.31	35.58	35.86	.12
.13	36.14	36.42	36.70	36.97	37.25	37.53	37.81	38.09	38.36	38.64	.13
.14	38.92	39.20	39.48	39.75	40.03	40.31	40.59	40.87	41.14	41.42	.14
.15	41.70	41.98	42.26	42.53	42.81	43.09	43.37	43.65	43.92	44.20	.15
.16	44.48	44.76	45.04	45.31	45.59	45.87	46.15	46.43	46.70	46.98	.16
.17	47.26	47.54	47.82	48.09	48.37	48.65	48.93	49.21	49.48	49.76	.17
.18	50.04	50.32	50.60	50.87	51.15	51.43	51.71	51.99	52.26	52.54	.18
.19	52.82	53.10	53.38	53.65	53.93	54.21	54.49	54.77	55.04	55.32	.19
.20	55.60	55.88	56.16	56.43	56.71	56.99	57.27	57.55	57.82	58.10	.20
.21	58.38	58.66	58.94	59.21	59.49	59.77	60.05	60.33	60.60	60.88	.21
.22	61.16	61.44	61.72	61.99	62.27	62.55	62.83	63.11	63.38	63.66	.22
.23	63.94	64.22	64.50	64.77	65.05	65.33	65.61	65.89	66.16	66.44	.23
.24	66.72	67.00	67.28	67.55	67.83	68.11	68.39	68.67	68.94	69.22	.24

NEPHELITE, $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ (MOLECULAR WEIGHT, 284).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.28	0.57	0.85	1.14	1.42	1.70	1.99	2.27	2.56	0.00
.01	2.84	3.12	3.41	3.69	3.98	4.26	4.54	4.83	5.11	5.40	.01
.02	5.68	5.96	6.25	6.53	6.82	7.10	7.38	7.67	7.95	8.24	.02
.03	8.52	8.80	9.09	9.37	9.66	9.94	10.22	10.51	10.79	11.08	.03
.04	11.36	11.64	11.93	12.21	12.50	12.78	13.06	13.35	13.63	13.92	.04
.05	14.20	14.48	14.77	15.05	15.34	15.62	15.90	16.19	16.47	16.76	.05
.06	17.04	17.32	17.61	17.89	18.18	18.46	18.74	19.03	19.31	19.60	.06
.07	19.88	20.16	20.45	20.73	21.02	21.30	21.58	21.87	22.15	22.44	.07
.08	22.72	23.00	23.28	23.57	23.86	24.14	24.42	24.71	24.99	25.28	.08
.09	25.56	25.84	26.13	26.41	26.70	26.98	27.26	27.55	27.83	28.12	.09
.10	28.40	28.68	28.97	29.25	29.54	29.82	30.10	30.39	30.67	30.96	.10
.11	31.24	31.52	31.81	32.09	32.38	32.66	32.94	33.23	33.51	33.80	.11
.12	34.08	34.36	34.65	34.93	35.22	35.50	35.78	36.07	36.35	36.64	.12
.13	36.92	37.20	37.49	37.77	38.06	38.34	38.62	38.91	39.19	39.48	.13
.14	39.76	40.04	40.33	40.61	40.90	41.18	41.46	41.75	41.93	42.32	.14
.15	42.60	42.88	43.17	43.45	43.74	44.02	44.30	44.59	44.87	45.16	.15
.16	45.44	45.72	46.01	46.29	46.58	46.86	47.14	47.43	47.71	48.00	.16
.17	48.28	48.56	48.85	49.13	49.42	49.70	49.98	50.27	50.55	50.84	.17
.18	51.12	51.40	51.69	51.97	52.26	52.54	52.82	53.11	53.39	53.68	.18
.19	53.96	54.24	54.53	54.81	55.10	55.38	55.66	55.95	56.23	56.52	.19

LEUCITE, $\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2$ (MOLECULAR WEIGHT, 436).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.44	0.87	1.31	1.74	2.18	2.62	3.05	3.49	3.92	0.00
.01	4.36	4.80	5.23	5.67	6.10	6.54	6.98	7.41	7.85	8.28	.01
.02	8.72	9.16	9.59	10.03	10.46	10.90	11.34	11.77	12.21	12.64	.02
.03	13.08	13.52	13.95	14.39	14.82	15.26	15.70	16.13	16.57	17.00	.03
.04	17.44	17.88	18.31	18.75	19.18	19.62	20.06	20.49	20.93	21.36	.04
.05	21.80	22.24	22.67	23.11	23.54	23.98	24.42	24.85	25.29	25.72	.05
.06	26.16	26.60	27.03	27.47	27.90	28.34	28.78	29.21	29.65	30.08	.06
.07	30.52	30.96	31.39	31.83	32.26	32.70	33.14	33.57	34.01	34.44	.07
.08	34.88	35.32	35.75	36.19	36.62	37.06	37.50	37.93	38.37	38.80	.08
.09	39.24	39.68	40.11	40.55	40.98	41.42	41.86	42.29	42.73	43.16	.09

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

CALCIUM METASILICATE (WOLLASTONITE), $\text{CaO} \cdot \text{SiO}_2$ (MOLECULAR WEIGHT, 116).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.12	0.23	0.35	0.46	0.58	0.70	0.81	0.93	1.04	0.00
.01	1.16	1.28	1.39	1.51	1.63	1.74	1.86	1.97	2.09	2.20	.01
.02	2.32	2.44	2.55	2.67	2.78	2.90	3.02	3.13	3.25	3.36	.02
.03	3.48	3.60	3.71	3.83	3.94	4.06	4.18	4.29	4.41	4.52	.03
.04	4.64	4.76	4.87	4.99	5.10	5.22	5.34	5.45	5.57	5.68	.04
.05											.05
.06	5.80	5.92	6.03	6.15	6.26	6.38	6.50	6.61	6.73	6.84	.06
.07	6.96	7.08	7.19	7.31	7.42	7.54	7.66	7.77	7.89	8.00	.07
.08	8.12	8.24	8.35	8.47	8.58	8.70	8.82	8.93	9.05	9.16	.08
.09	9.28	9.40	9.51	9.63	9.74	9.86	9.98	10.09	10.21	10.32	.09
.10	10.44	10.56	10.67	10.79	10.90	11.02	11.14	11.25	11.37	11.48	.10
.11											.11
.12	11.60	11.72	11.83	11.95	12.06	12.18	12.30	12.41	12.53	12.64	.12
.13	12.76	12.88	12.99	13.11	13.22	13.34	13.46	13.57	13.69	13.80	.13
.14	13.92	14.04	14.15	14.27	14.38	14.50	14.62	14.73	14.85	14.96	.14
.15	15.08	15.20	15.31	15.43	15.54	15.66	15.78	15.89	16.01	16.12	.15
.16	16.24	16.36	16.47	16.59	16.70	16.82	16.93	17.05	17.17	17.28	.16
.17											.17
.18	17.40	17.52	17.63	17.75	17.86	17.98	18.10	18.21	18.33	18.44	.18
.19	18.56	18.68	18.79	18.91	19.02	19.14	19.26	19.37	19.49	19.60	.19
.20	19.72	19.84	19.95	20.07	20.18	20.30	20.42	20.53	20.65	20.76	.20
.21	20.88	21.00	21.11	21.23	21.34	21.46	21.58	21.69	21.81	21.92	.21
.22	22.04	22.16	22.27	22.39	22.50	22.62	22.74	22.85	22.97	23.08	.22
.23											.23
.24	23.20	23.32	23.43	23.55	23.66	23.78	23.90	24.01	24.13	24.24	.24
.25	24.36	24.48	24.59	24.71	24.82	24.94	25.06	25.17	25.29	25.40	.25
.26	25.52	25.64	25.75	25.87	25.98	26.10	26.22	26.33	26.45	26.56	.26
.27	26.68	26.80	26.91	27.03	27.14	27.26	27.38	27.49	27.61	27.72	.27
.28	27.84	27.96	28.07	28.19	28.30	28.42	28.54	28.65	28.77	28.88	.28
.29											.29
.30	29.00	29.12	29.23	29.35	29.46	29.58	29.70	29.81	29.93	30.04	.30
.31	30.16	30.28	30.39	30.51	30.63	30.74	30.86	30.97	31.09	31.20	.31
.32	31.32	31.44	31.55	31.67	31.78	31.90	32.02	32.13	32.25	32.36	.32
.33	32.48	32.60	32.71	32.83	32.94	33.06	33.18	33.29	33.41	33.52	.33
.34	33.64	33.76	33.87	33.99	34.10	34.22	34.34	34.45	34.57	34.68	.34
.35											.35
.36	34.80	34.92	35.03	35.15	35.26	35.38	35.50	35.61	35.73	35.84	.36
.37	35.96	36.08	36.19	36.31	36.42	36.54	36.66	36.77	36.89	37.00	.37
.38	37.12	37.24	37.35	37.47	37.58	37.70	37.82	37.93	38.05	38.16	.38
.39	38.28	38.40	38.51	38.63	38.74	38.86	38.98	39.09	39.21	39.32	.39
.40	39.44	39.56	39.67	39.79	39.90	40.02	40.14	40.25	40.37	40.48	.40
.41											.41
.42	40.60	40.72	40.83	40.95	41.06	41.18	41.30	41.41	41.53	41.64	.42
.43	41.76	41.88	41.99	42.11	42.22	42.34	42.46	42.57	42.69	42.80	.43
.44	42.92	43.04	43.15	43.27	43.38	43.50	43.62	43.73	43.85	43.96	.44
.45	44.08	44.20	44.31	44.43	44.54	44.66	44.78	44.89	45.01	45.12	.45
.46	45.24	45.36	45.47	45.59	45.70	45.82	45.93	46.05	46.17	46.28	.46

MAGNESIUM METASILICATE, $\text{MgO} \cdot \text{SiO}_2$ (MOLECULAR WEIGHT, 100).(Multiply molecular number of MgO by 100.) •IRON METASILICATE, $\text{FeO} \cdot \text{SiO}_2$ (MOLECULAR WEIGHT, 132).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.13	0.26	0.40	0.53	0.66	0.79	0.92	1.06	1.19	0.00
.01	1.32	1.45	1.58	1.72	1.85	1.98	2.11	2.24	2.38	2.51	.01
.02	2.64	2.77	2.90	3.04	3.17	3.30	3.43	3.56	3.70	3.83	.02
.03	3.96	4.09	4.22	4.36	4.49	4.62	4.75	4.88	5.02	5.15	.03
.04	5.28	5.41	5.54	5.68	5.81	5.94	6.07	6.20	6.34	6.47	.04
.05	6.60	6.73	6.86	7.00	7.13	7.26	7.39	7.52	7.66	7.79	.05
.06	7.92	8.05	8.18	8.32	8.45	8.58	8.71	8.84	8.98	9.11	.06
.07	9.24	9.37	9.50	9.64	9.77	9.90	10.03	10.16	10.30	10.43	.07
.08	10.56	10.69	10.82	10.96	11.09	11.22	11.35	11.48	11.62	11.75	.08
.09	11.88	12.01	12.14	12.28	12.41	12.54	12.67	12.80	12.94	13.07	.09
.10	13.20	13.33	13.46	13.60	13.73	13.86	13.99	14.12	14.26	14.39	.10
.11	14.52	14.65	14.78	14.92	15.05	15.18	15.31	15.44	15.58	15.71	.11
.12	15.84	15.97	16.10	16.24	16.37	16.50	16.63	16.76	16.90	17.03	.12
.13	17.16	17.29	17.42	17.56	17.69	17.82	17.95	18.08	18.22	18.35	.13
.14	18.48	18.61	18.74	18.88	19.01	19.14	19.27	19.40	19.54	19.67	.14
.15	19.80	19.93	20.06	20.20	20.33	20.46	20.59	20.72	20.86	20.99	.15
.16	21.12	21.25	21.38	21.52	21.65	21.78	21.91	22.04	22.18	22.31	.16
.17	22.44	22.57	22.70	22.84	22.97	23.10	23.23	23.36	23.50	23.63	.17
.18	23.76	23.89	24.02	24.16	24.29	24.42	24.55	24.68	24.82	24.95	.18
.19	25.08	25.21	25.34	25.48	25.61	25.74	25.87	26.00	26.14	26.27	.19
.20	26.40	26.53	26.66	26.80	26.93	27.06	27.19	27.32	27.46	27.59	.20
.21	27.72	27.85	27.98	28.12	28.25	28.38	28.51	28.64	28.78	28.91	.21
.22	29.04	29.17	29.30	29.44	29.57	29.70	29.83	29.96	30.10	30.23	.22
.23	30.36	30.49	30.62	30.76	30.89	31.02	31.15	31.28	31.42	31.55	.23
.24	31.68	31.81	31.94	32.08	32.21	32.34	32.47	32.60	32.74	32.87	.24
.25	33.00	33.13	33.26	33.40	33.53	33.66	33.79	33.92	34.06	34.19	.25
.26	34.32	34.45	34.58	34.72	34.85	34.98	35.11	35.24	35.38	35.51	.26
.27	35.64	35.77	35.90	36.04	36.17	36.30	36.43	36.56	36.70	36.83	.27
.28	36.96	37.09	37.22	37.36	37.49	37.62	37.75	37.88	38.02	38.15	.28
.29	38.28	38.41	38.54	38.68	38.81	38.94	39.07	39.20	39.34	39.47	.29
.30	39.60	39.73	39.86	40.00	40.13	40.26	40.39	40.52	40.66	40.79	.30
.31	40.92	41.05	41.18	41.32	41.45	41.58	41.71	41.84	41.98	42.11	.31
.32	42.24	42.37	42.50	42.64	42.77	42.90	43.03	43.16	43.30	43.43	.32
.33	43.56	43.69	43.82	43.96	44.09	44.22	44.35	44.48	44.62	44.75	.33
.34	44.88	45.01	45.14	45.28	45.41	45.54	45.67	45.80	45.94	46.07	.34
.35	46.20	46.33	46.46	46.60	46.73	46.86	46.99	47.12	47.26	47.39	.35
.36	47.52	47.65	47.78	47.92	48.05	48.18	48.31	48.44	48.58	48.71	.36
.37	48.84	48.97	49.10	49.24	49.37	49.50	49.63	49.76	49.90	50.03	.37
.38	50.16	50.29	50.42	50.56	50.69	50.82	50.95	51.08	51.22	51.35	.38
.39	51.48	51.61	51.74	51.88	52.01	52.14	52.27	52.40	52.54	52.67	.39

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

MAGNESIUM ORTHOSILICATE (FORSTERITE), $2\text{MgO} \cdot \text{SiO}_2$ (MOLECULAR WEIGHT, 140).(Unit of calculation is one-half molecular number of MgO .)

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.14	0.28	0.42	0.56	0.70	0.84	0.98	1.12	1.26	0.00
.01	1.40	1.54	1.68	1.82	1.96	2.10	2.24	2.38	2.52	2.66	.01
.02	2.80	2.94	3.08	3.22	3.36	3.50	3.64	3.78	3.92	4.06	.02
.03	4.20	4.34	4.48	4.62	4.76	4.90	5.04	5.18	5.32	5.46	.03
.04	5.60	5.74	5.88	6.02	6.16	6.30	6.44	6.58	6.72	6.86	.04
.05	7.00	7.14	7.28	7.42	7.56	7.70	7.84	7.98	8.12	8.26	.05
.06	8.40	8.54	8.68	8.82	8.96	9.10	9.24	9.38	9.52	9.66	.06
.07	9.80	9.94	10.08	10.22	10.36	10.50	10.64	10.78	10.92	11.06	.07
.08	11.20	11.34	11.48	11.62	11.76	11.90	12.04	12.18	12.32	12.46	.08
.09	12.60	12.74	12.88	13.02	13.16	13.30	13.44	13.58	13.72	13.86	.09
.10	14.00	14.14	14.28	14.42	14.56	14.70	14.84	14.98	15.12	15.26	.10
.11	15.40	15.54	15.68	15.82	15.96	16.10	16.24	16.38	16.52	16.66	.11
.12	16.80	16.94	17.08	17.22	17.36	17.50	17.64	17.78	17.92	18.06	.12
.13	18.20	18.34	18.48	18.62	18.76	18.90	19.04	19.18	19.32	19.46	.13
.14	19.60	19.74	19.88	20.02	20.16	20.30	20.44	20.58	20.72	20.86	.14
.15	21.00	21.14	21.28	21.42	21.56	21.70	21.84	21.98	22.12	22.26	.15
.16	22.40	22.54	22.68	22.82	22.96	23.10	23.24	23.38	23.52	23.66	.16
.17	23.80	23.94	24.08	24.22	24.36	24.50	24.64	24.78	24.92	25.06	.17
.18	25.20	25.34	25.48	25.62	25.76	25.90	26.04	26.18	26.32	26.46	.18
.19	26.60	26.74	26.88	27.02	27.16	27.30	27.44	27.58	27.72	27.86	.19
.20	28.00	28.14	28.28	28.42	28.56	28.70	28.84	28.98	29.12	29.26	.20
.21	29.40	29.54	29.68	29.82	29.96	30.10	30.24	30.38	30.52	30.66	.21
.22	30.80	30.94	31.08	31.22	31.36	31.50	31.64	31.78	31.92	32.06	.22
.23	32.20	32.34	32.48	32.62	32.76	32.90	33.04	33.18	33.32	33.46	.23
.24	33.60	33.74	33.88	34.02	34.16	34.30	34.44	34.58	34.72	34.86	.24
.25	35.00	35.14	35.28	35.42	35.56	35.70	35.84	35.98	36.12	36.26	.25
.26	36.40	36.54	36.68	36.82	36.96	37.10	37.24	37.38	37.52	37.66	.26
.27	37.80	37.94	38.08	38.22	38.36	38.50	38.64	38.78	38.92	39.06	.27
.28	39.20	39.34	39.48	39.62	39.76	39.90	40.04	40.18	40.32	40.46	.28
.29	40.60	40.74	40.88	41.02	41.16	41.30	41.44	41.58	41.72	41.86	.29
.30	42.00	42.14	42.28	42.42	42.56	42.70	42.84	42.98	43.12	43.26	.30
.31	43.40	43.54	43.68	43.82	43.96	44.10	44.24	44.38	44.52	44.66	.31
.32	44.80	44.94	45.08	45.22	45.36	45.50	45.64	45.78	45.92	46.06	.32
.33	46.20	46.34	46.48	46.62	46.76	46.90	47.04	47.17	47.32	47.46	.33
.34	47.60	47.74	47.88	48.02	48.16	48.30	48.44	48.58	48.72	48.86	.34
.35	49.00	49.14	49.28	49.42	49.56	49.70	49.84	49.98	50.12	20.26	.35
.36	50.40	50.54	50.68	50.82	50.96	51.10	51.24	51.38	51.52	51.66	.36
.37	51.80	51.94	52.08	52.22	52.36	52.50	52.64	52.78	52.92	53.06	.37
.38	53.20	53.34	53.48	53.62	53.76	53.90	54.04	54.18	54.32	54.46	.38
.39	54.60	54.74	54.88	55.02	55.16	55.30	55.44	55.58	55.72	55.86	.39

IRON ORTHOSILICATE (FAYALITE), $2\text{FeO} \cdot \text{SiO}_2$ (MOLECULAR WEIGHT, 204).(Unit of calculation is one-half molecular number of FeO .)

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.20	0.41	0.61	0.82	1.02	1.22	1.43	1.63	1.84	0.00
.01	2.04	2.24	2.45	2.65	2.86	3.06	3.26	3.47	3.67	3.88	.01
.02	4.08	4.28	4.49	4.69	4.90	5.10	5.30	5.51	5.71	5.92	.02
.03	6.12	6.32	6.53	6.73	6.94	7.14	7.34	7.55	7.75	7.96	.03
.04	8.16	8.36	8.57	8.77	8.98	9.18	9.38	9.59	9.79	10.00	.04
.05	10.20	10.40	10.61	10.81	11.02	11.22	11.42	11.63	11.83	12.04	.05
.06	12.24	12.44	12.65	12.85	13.06	13.26	13.46	13.67	13.87	14.08	.06
.07	14.28	14.48	14.69	14.89	15.10	15.30	15.50	15.71	15.91	16.12	.07
.08	16.32	16.52	16.72	16.93	17.14	17.34	17.54	17.75	17.95	18.16	.08
.09	18.36	18.56	18.77	18.97	19.18	19.38	19.58	19.79	19.99	20.20	.09
.10	20.40	20.60	20.81	21.01	21.22	21.42	21.62	21.83	22.03	22.24	.10
.11	22.44	22.64	22.85	23.05	23.26	23.46	23.66	23.87	24.07	24.28	.11
.12	24.48	24.68	24.89	25.09	25.30	25.50	25.70	25.91	26.11	26.32	.12
.13	26.52	26.72	26.93	27.13	27.34	27.54	27.74	27.95	28.15	28.36	.13
.14	28.56	28.76	28.97	29.17	29.38	29.58	29.78	29.99	30.19	30.40	.14
.15	30.60	30.80	31.01	31.21	31.42	31.62	31.82	32.03	32.23	32.44	.15
.16	32.64	32.84	33.05	33.25	33.46	33.66	33.86	34.07	34.27	34.48	.16
.17	34.68	34.88	35.11	35.31	35.50	35.70	35.90	36.11	36.31	36.52	.17
.18	36.72	36.92	37.15	37.35	37.54	37.74	37.94	38.15	38.35	38.56	.18
.19	38.76	38.96	39.19	39.39	39.58	39.78	39.98	40.19	40.39	40.60	.19

CALCIUM ORTHOSILICATE, $2\text{CaO} \cdot \text{SiO}_2$ (MOLECULAR WEIGHT, 172).(Unit of calculation is one-half molecular number of CaO .)

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.17	0.34	0.52	0.69	0.86	1.03	1.20	1.38	1.55	0.00
.01	1.72	1.89	2.06	2.24	2.41	2.58	2.75	2.92	3.10	3.27	.01
.02	3.44	3.61	3.78	3.96	4.13	4.30	4.47	4.64	4.82	4.99	.02
.03	5.16	5.33	5.50	5.66	5.85	6.02	6.19	6.36	6.54	6.71	.03
.04	6.88	7.05	7.22	7.40	7.57	7.74	7.91	8.08	8.26	8.43	.04
.05	8.00	8.77	8.94	9.12	9.29	9.46	9.63	9.80	9.98	10.15	.05
.06	10.32	10.49	10.66	10.84	11.01	11.18	11.35	11.52	11.70	11.87	.06
.07	12.04	12.21	12.38	12.56	12.73	12.90	13.07	13.24	13.42	13.59	.07
.08	13.76	13.93	14.10	14.28	14.45	14.62	14.79	14.96	15.14	15.31	.08
.09	15.48	15.65	15.82	16.00	16.17	16.34	16.51	16.68	16.86	17.03	.09

CHEMICAL ANALYSES OF IGNEOUS ROCKS.

MAGNETITE, $\text{FeO} \cdot \frac{1}{2}\text{Fe}_2\text{O}_3$ (MOLECULAR WEIGHT, 232).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.23	0.46	0.70	0.93	1.16	1.39	1.62	1.86	2.09	0.00
.01	2.32	2.55	2.78	3.02	3.25	3.48	3.71	3.94	4.18	4.41	.01
.02	4.64	4.87	5.10	5.34	5.57	5.80	6.03	6.26	6.50	6.73	.02
.03	6.96	7.19	7.42	7.66	7.89	8.12	8.35	8.58	8.82	9.05	.03
.04	9.28	9.51	9.74	9.98	10.21	10.44	10.67	10.90	11.14	11.37	.04
.05	11.60	11.83	12.06	12.30	12.53	12.76	12.99	13.22	13.46	13.69	.05
.06	13.92	14.15	14.38	14.62	14.85	15.08	15.31	15.54	15.78	16.01	.06
.07	16.24	16.47	16.70	16.94	17.17	17.40	17.63	17.86	18.10	18.33	.07
.08	18.56	18.79	19.02	19.26	19.49	19.72	19.95	20.18	20.42	20.65	.08
.09	20.88	21.11	21.34	21.58	21.81	22.04	22.27	22.50	22.74	22.97	.09

ILMENITE, $\text{FeO} \cdot \text{TiO}_2$ (MOLECULAR WEIGHT, 152).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.15	0.30	0.46	0.61	0.76	0.91	1.06	1.22	1.37	0.00
.01	1.52	1.67	1.82	1.98	2.13	2.28	2.43	2.58	2.74	2.89	.01
.02	3.04	3.19	3.34	3.50	3.65	3.80	3.95	4.10	4.26	4.41	.02
.03	4.56	4.71	4.86	5.02	5.17	5.32	5.47	5.62	5.78	5.93	.03
.04	6.08	6.23	6.38	6.54	6.69	6.84	6.99	7.14	7.30	7.45	.04
.05	7.60	7.75	7.90	8.06	8.21	8.36	8.51	8.66	8.82	8.97	.05
.06	9.12	9.27	9.42	9.58	9.73	9.88	10.03	10.18	10.34	10.49	.06
.07	10.64	10.79	10.94	11.10	11.25	11.40	11.55	11.70	11.86	12.01	.07
.08	12.16	12.31	12.46	12.62	12.77	12.92	13.07	13.23	13.38	13.53	.08
.09	13.68	13.83	13.98	14.14	14.29	14.44	14.59	14.74	14.90	15.05	.09

HEMATITE, Fe_2O_3 (MOLECULAR WEIGHT, 160).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.16	0.32	0.48	0.64	0.80	0.96	1.12	1.28	1.44	0.00
.01	1.60	1.76	1.92	2.08	2.24	2.40	2.56	2.72	2.88	3.04	.01
.02	3.20	3.36	3.52	3.68	3.84	4.00	4.16	4.32	4.48	4.64	.02
.03	4.80	4.96	5.12	5.28	5.44	5.60	5.76	5.92	6.08	6.24	.03
.04	6.40	6.56	6.72	6.88	7.04	7.20	7.36	7.52	7.68	7.84	.04

APATITE, $3\text{CaO} \cdot \text{P}_2\text{O}_5 + \frac{\text{CaF}_2}{3}$ (MOLECULAR WEIGHT, 336).(Unit of calculation is molecular proportion of P_2O_5 .)

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.34	0.67	1.01	1.34	1.68	2.02	2.35	2.69	3.02	0.00
.01	3.36	3.70	4.03	4.37	4.70	5.04	5.38	5.71	6.05	6.38	.01
.02	6.72	7.06	7.39	7.73	8.06	8.40	8.74	9.07	9.41	9.74	.02
.03	10.08	10.42	10.75	11.09	11.42	11.76	12.10	12.43	12.77	13.10	.03
.04	13.44	13.78	14.11	14.45	14.78	15.12	15.46	15.79	16.13	16.46	.04

ACMITE, $\text{Na}_2\text{O} \cdot \text{Fe}_2\text{O}_3 \cdot 4\text{SiO}_2$ (MOLECULAR WEIGHT, 462).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.46	0.92	1.39	1.85	2.31	2.77	3.23	3.70	4.16	0.00
.01	4.62	5.08	5.54	6.01	6.47	6.93	7.39	7.85	8.32	8.78	.01
.02	9.24	9.70	10.16	10.63	11.09	11.55	12.01	12.47	12.94	13.40	.02
.03	13.86	14.32	14.78	15.25	15.71	16.17	16.63	17.09	17.56	18.02	.03
.04	18.48	18.94	19.40	19.87	20.33	20.79	21.25	21.71	22.18	22.64	.04
.05	23.10	23.56	24.02	24.49	24.95	25.41	25.87	26.33	26.80	27.26	.05
.06	27.72	28.18	28.64	29.11	29.57	30.03	30.49	30.95	31.42	31.88	.06
.07	32.34	32.80	33.26	33.73	34.19	34.65	35.11	35.57	36.04	36.50	.07
.08	36.96	37.42	37.88	38.35	38.81	39.27	39.73	40.19	40.66	41.12	.08
.09	41.58	42.04	42.50	42.97	43.43	43.89	44.35	44.81	45.28	45.74	.09

CORUNDUM, Al_2O_3 (MOLECULAR WEIGHT, 102).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.10	0.20	0.31	0.41	0.51	0.61	0.71	0.82	0.92	0.00
.01	1.02	1.12	1.22	1.33	1.43	1.53	1.63	1.73	1.84	1.94	.01
.02	2.04	2.14	2.24	2.35	2.45	2.55	2.65	2.75	2.86	2.96	.02
.03	3.06	3.16	3.26	3.37	3.47	3.57	3.67	3.77	3.88	3.98	.03
.04	4.08	4.18	4.28	4.39	4.49	4.59	4.69	4.79	4.90	5.00	.04
.05	5.10	5.20	5.30	5.41	5.51	5.61	5.71	5.81	5.92	6.02	.05
.06	6.12	6.22	6.32	6.43	6.53	6.63	6.73	6.83	6.94	7.04	.06
.07	7.14	7.24	7.34	7.45	7.55	7.65	7.75	7.85	7.96	8.06	.07
.08	8.16	8.26	8.36	8.47	8.57	8.67	8.77	8.87	8.98	9.08	.08
.09	9.18	9.28	9.38	9.49	9.59	9.69	9.76	9.89	10.00	10.10	.09

ZIRCON, $ZrO_2 \cdot SiO_2$ (MOLECULAR WEIGHT, 183).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.18	0.37	0.55	0.73	0.91	1.10	1.28	1.46	1.65	0.00
.01	1.83	2.01	2.20	2.38	2.56	2.75	2.93	3.11	3.29	3.48	.01
.02	3.66	3.84	4.03	4.21	4.39	4.58	4.76	4.94	5.12	5.31	.02
.03	5.49	5.67	5.86	6.04	6.22	6.41	6.59	6.77	6.95	7.14	.03
.04	7.32	7.50	7.78	7.87	8.05	8.24	8.42	8.60	8.78	8.97	.04

HALITE, Na_2Cl_2 (MOLECULAR WEIGHT, 117).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.12	0.23	0.35	0.47	0.59	0.70	0.82	0.94	1.05	0.00
.01	1.17	1.29	1.40	1.52	1.64	1.76	1.87	1.99	2.11	2.22	.01
.02	2.34	2.46	2.57	2.69	2.81	2.93	3.04	3.16	3.28	3.39	.02
.03	3.51	3.63	3.74	3.86	3.98	4.10	4.21	4.33	4.45	4.56	.03
.04	4.68	4.80	4.91	5.03	5.15	5.27	5.38	5.50	5.62	5.73	.04

THENARDITE, Na_2SO_4 (MOLECULAR WEIGHT, 142).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.14	0.28	0.43	0.57	0.71	0.85	0.99	1.14	1.28	0.00
.01	1.42	1.56	1.70	1.85	1.99	2.13	2.27	2.41	2.56	2.70	.01
.02	2.84	2.98	3.12	3.27	3.41	3.55	3.69	3.83	3.98	4.12	.02
.03	4.26	4.40	4.54	4.69	4.83	4.97	5.11	5.25	5.40	5.54	.03
.04	5.68	5.82	5.96	6.11	6.25	6.39	6.53	6.67	6.82	6.96	.04

SODIUM METASILICATE, $\text{Na}_2\text{O} \cdot \text{SiO}_2$ (MOLECULAR WEIGHT, 122).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.12	0.24	0.37	0.49	0.61	0.73	0.85	0.98	1.10	0.00
.01	1.22	1.34	1.46	1.59	1.71	1.83	1.95	2.07	2.20	2.32	.01
.02	2.44	2.56	2.68	2.81	2.93	3.05	3.17	3.29	3.42	3.54	.02
.03	3.66	3.78	3.90	4.03	4.15	4.27	4.39	4.51	4.64	4.76	.03
.04	4.88	5.00	5.12	5.25	5.37	5.49	5.61	5.73	5.86	5.98	.04

TITANITE, $\text{CaO} \cdot \text{TiO}_2 \cdot \text{SiO}_2$ (MOLECULAR WEIGHT, 196).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.20	0.39	0.59	0.78	0.98	1.18	1.37	1.57	1.76	0.00
.01	1.96	2.16	2.35	2.55	2.74	2.94	3.14	3.33	3.53	3.72	.01
.02	3.92	4.12	4.31	4.51	4.70	4.90	5.10	5.29	5.49	5.68	.02
.03	5.88	6.08	6.27	6.47	6.66	6.86	7.06	7.25	7.45	7.64	.03
.04	7.84	8.04	8.23	8.43	8.62	8.82	9.02	9.21	9.41	9.60	.04

PEROVSKITE, $\text{CaO} \cdot \text{TiO}_2$ (MOLECULAR WEIGHT, 136).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.14	0.27	0.41	0.54	0.68	0.82	0.95	1.09	1.22	0.00
.01	1.36	1.50	1.63	1.77	1.90	2.04	2.18	2.31	2.45	2.58	.01
.02	2.72	2.86	2.99	3.13	3.26	3.40	3.54	3.67	3.81	3.94	.02
.03	4.08	4.22	4.35	4.49	4.62	4.76	4.90	5.03	5.17	5.30	.03
.04	5.44	5.58	5.71	5.85	5.98	6.12	6.26	6.39	6.53	6.66	.04

FLUORITE, CaF_2 (MOLECULAR WEIGHT, 78).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.07	0.16	0.23	0.31	0.39	0.47	0.55	0.62	0.70	0.00
.01	.78	.86	.94	1.01	1.09	1.17	1.25	1.33	1.40	1.48	.01
.02	1.56	1.64	1.72	1.79	1.87	1.95	2.03	2.11	2.18	2.26	.02
.03	2.34	2.42	2.50	2.57	2.65	2.73	2.81	2.89	2.96	3.04	.03
.04	3.12	3.20	3.28	3.35	3.43	3.51	3.59	3.67	3.74	3.82	.04

SODIUM CARBONATE, $\text{Na}_2\text{O} \cdot \text{CO}_2$ (MOLECULAR WEIGHT, 106).

Mol.	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	Mol.
0.00	0.00	0.11	0.21	0.32	0.42	0.53	0.64	0.74	0.85	0.95	0.00
.01	1.07	1.17	1.27	1.38	1.48	1.59	1.70	1.80	1.91	2.01	.01
.02	2.12	2.23	2.33	2.44	2.54	2.65	2.76	2.86	2.97	3.07	.02
.03	3.18	3.29	3.39	3.50	3.60	3.71	3.82	3.92	4.03	4.13	.03
.04	4.24	4.35	4.45	4.56	4.66	4.77	4.88	4.98	5.09	5.19	.04

CALCITE, $\text{CaO} \cdot \text{CO}_2$ (MOLECULAR WEIGHT, 100).

(Multiply molecular number by 100.)

THE INDEXES.

PREFATORY NOTE.

Because of the typographical arrangement of the tables a page reference to the part of this work that is covered by them implies also the opposite page, both pages being considered together. The odd-numbered (right-hand) page is the one generally referred to, as on this page appear the rock name, locality, reference, and other details.

The title "Index to new rock names," formerly used, has been changed to "Index to normative names" to emphasize the fact that the names of the divisions of the quantitative system are not names of *rocks* but designate the chemical and standard mineral characters that are embraced in the term "normative." Also the word *old* has been omitted from the former title "Index to old rock names," as this adjective is inappropriate in view of the present general use of these names and because such names are now being given to rocks and will doubtless continue to be given to them in the future.

The "Index to the text," which includes the index to the appendixes, has been made very detailed, possibly too much so; but it has been thought better to err on the side of including too much rather than too little. The "Index to normative names" includes all names that have been proposed, so far as known, up to 1917. Those that have been accepted and are used in Part I of the tables are followed by their symbols, which show their magmatic positions. Those that have been rejected and not so used are printed in *italics*. They are discussed on pages 34-36.

In the "Index to rock names" and the "Index to localities" the page numbers that refer to Part I of the tables are separated by a dash (—) from those that refer to the other parts. The page numbers that refer to Part IV (inferior analyses) are printed in *italics*. It may be well to mention that if a rock or locality name is not found on the page given in the index it may possibly be found on the succeeding (odd-numbered) page.

In the "Index to rock names" mineral qualifiers have been omitted where the qualifier would imply no especially important or interesting magmatic or mineralogic character. Thus biotite andesite and hornblende andesite are to be looked for under andesite. Olivine basalt and olivine gabbro are indexed under basalt and gabbro, respectively. Granitite is to be looked for under granite. If, however, the mineral qualifier indicates a peculiarly interesting or unusual magmatic or modal character, or if the mineral men-

tioned is of rare occurrence, the qualifier is retained, as in the names of aegirite granite, analcite basalt, cancrinite syenite, magnetite basalt, and quartz basalt. The mineral qualifier is of course retained in such names as nephelite syenite and quartz diorite. Textural qualifiers are usually omitted from the index; for example, andesite porphyry will be found under andesite, though granite porphyry and diorite porphyry are retained.

In using this index the existence of many synonyms should be borne in mind. Thus some rocks that might be called liparite may be found under rhyolite, some dolerites under basalt, and vice versa. The French labradorites are also indexed under basalt. The usage of the terms "porphyry" and "porphyrite" in the literature has not been uniform, and the two are frequently interchanged. In the index these names imply that no mineral qualifier is used by the describer or that the qualifier is the name of a common mafic mineral, such as augite, biotite, or hornblende. Quartz porphyry is retained in the index. Such textural terms as obsidian and pumice (indexed alone) imply that no qualifier has been used by the describer of the rock. A "trachyte obsidian" or "rhyolite pumice" is to be found under these full terms, respectively.

Inclusions (such as "segregations" and "secretions") and schlieren are indexed both under the name of the inclosing rock and under the terms "inclusions" and "schlieren," as they may be of special interest for some investigations. The few analyses of rock fragments brought up from the ocean floor are also indexed collectively under the term "dredged blocks."

The "Index to localities" has been the subject of considerable thought and consultation. The convenience of the petrologist, rather than consistency, has been the chief consideration. The attempt has been made to keep together, so far as possible, page references to analyses of rocks that occur in the same district or analyses that are given in the same paper. Arrays of figures such as are given in the first edition under Italy, California, and Montana, and such as would be very much more numerous in the present work, which contains three times as many analyses, would be inconvenient and of very little use, consuming much time in looking up an analysis and hiding many petrographic or bibliographic relations. To obviate this objection the present index has been prepared in much greater detail, and in general a district or locality is indexed separately if it is represented on three or more pages.

The primary grouping is by countries, colonies, and detached or oceanic islands. Under countries and colonies the arrangement is to a large extent by States, Provinces, and such political subdivisions, though here the selection is not always that of a present-day political division, such as Scania in Sweden and Auvergne and Brittany in France. The colonies that form the Australian Federation are indexed under Australia, but those that now form the Union of South Africa are indexed separately.

For some countries—such as Germany, Italy, and Sweden—there is a primary subdivision into both political divisions and petrographic districts on an equal footing. The political divisions and geographical nomenclature of Germany especially are so complex, and the analyses of rocks from that country are so numerous, that it has required special treatment. A district or a mountain group that lies wholly within one German State is treated as a subheading under that State, as, for example, the Hegau and the Kaiserstuhl, which are subheadings under Baden. On the other hand, such districts as the Harz, Lausitz, and Odenwald, which border on or form part of several provinces and are petrographically important and well known, are given separate main headings. The Vosges are referred to France and the Erzgebirge to Germany. Some countries and States proved to be not readily subdivided or are represented by too few analyses to justify their subdivision. A further subdivision of States or Provinces into petrographic or mining districts is made if it seems to be called for in assisting reference.

If a country or State is subdivided into districts, the districts are given in alphabetic order, closing with the heading "Miscellaneous," under which are placed the page references to analyses from localities not thus separately grouped. As my detailed knowledge of many regions is inadequate, and as time was lacking for reconsultation of many papers, it may be well for a petrographer who is seeking all the analyses of a district to consult also the "Miscellaneous" list.

The treatment of the islands offered some peculiar problems. In general, islands that lie near the coast of a country to which they belong politically are indexed as subheadings under that country. Thus, the Channel Islands, The Isle of Man, and the Orkney Islands are subheadings under Great Britain; Corsica is a subheading under France; and the Aeolian Islands, Capraia, Elba, Sardinia, and Sicily are subheadings under Italy. Pantelleria and Linosa, however, are indexed separately. The islands in the Aegean Sea, whatever their past or present political status, are indexed under Greece, with the subheading Aegean Islands.

Oceanic islands and those that are widely detached from the country to which they belong (such as the Bermuda, Galapagos, and Juan Fernandez islands) are indexed separately. The name of the ocean in which they lie is added when they are small or are little known, to facilitate study of petrographic provinces. The small islands of the Malay Archipelago (such as Ambon, Bawean, Flores, and Timor) are also indexed separately, on an equal footing with Borneo, Celebes, Java, and Sumatra, the term "Malay Archipelago" being appended to them.

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THE COAL FIELDS OF THE UNITED STATES

GENERAL INTRODUCTION

By MARIUS R. CAMPBELL

OHIO

By J. A. BOWNOCKER



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NOTE.—The general introduction and the chapter on Ohio of the professional paper on the coal fields of the United States were published in 1917. As the plan of completing this paper has been abandoned a small edition of the two chapters combined has been published for exchanges and official sets.

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THE COAL FIELDS OF THE UNITED STATES.

GENERAL INTRODUCTION.

By MARIUS R. CAMPBELL.

PURPOSE AND SCOPE OF REPORT.

The growing demand for fuel and the probability that sooner or later the United States will be called upon to furnish supplies to less favored countries has made it desirable for the Geological Survey to take stock of the country's fuel and to determine the quantity, quality, and geographic distribution of the coal still in the ground and available for future use. This report is intended to supply such information regarding the coal fields in the United States, arranged according to the States within which they lie.

The first effort to give to the public a comprehensive description of the great coal-bearing areas of the country was made by the Geological Survey in 1902, by the publication, in the Twenty-second Annual Report of the Director, of 12 papers dealing with the coal-bearing areas of the United States, including Alaska. Unfortunately, this series of papers, although exceedingly interesting and valuable as presenting a summary of the then existing knowledge of some of the coal fields, was lamentably incomplete, for it contained no description of the rich fields of Maryland, West Virginia, eastern Kentucky, and Virginia; and the treatment of many of the western fields was unsatisfactory, for the reason that they had not been examined in detail, and consequently their boundaries and their contents could be described in only a vague and indefinite manner.

Up to the year 1905 the United States Geological Survey had made no effort to examine and map systematically the coal fields of the country, especially of the West; but a number of fields had been specially examined or had been mapped as a part of the general plan of

making a geologic atlas of the United States. This lack of activity in the examination of the coal resources was due largely to the lack of interest in such work shown by coal operators, owners, and consumers, as it was then generally regarded as unnecessary in the development of a coal-bearing tract to have any geologic information regarding the lay of the beds and the quality or quantity of the coal, and the consumer purchased his coal with but little thought as to whether or not he was getting the best available fuel for the particular use to which he expected to devote it.

About that time, however, the public began to awaken to the realization of the need of utilizing better the fuel supply and to the further realization that great frauds had been perpetrated in the Western States in procuring valuable coal lands under the homestead act and laws other than the coal-land law, which required the payment to the Government of not less than \$10 or \$20 an acre and restricted to 160 acres the area that it was possible for one person to acquire. In response to the public demand for the stopping of such frauds and for the better conservation of the fuel reserves of the country, President Roosevelt in 1906 withdrew from entry 66,000,000 acres of supposed coal land, and the United States Geological Survey was requested to classify these lands and appraise their value, so that they might be sold at prices that accorded with the quantity and quality of coal available in them. This was made possible by a new interpretation of the phraseology of the coal-land law of 1873, which specified that coal lands should be sold at not less than \$10 an acre if more than 15 miles from any completed railroad and not less than \$20 an acre if within 15 miles of a railroad.

In anticipation of this action the Geological Survey had begun in 1905 the systematic examination of coal fields in the public-land States and by 1908 had made sufficient progress in that work to issue the first reasonably accurate map of the coal fields of the country, on a scale of about 120 miles to the inch. In addition to outlining the coal fields, this map differentiates the areas of known coal from the areas that might possibly contain valuable coal and shows also those areas in which the coal-bearing rocks are under deep cover. On this map the coal fields are classified according to the rank of the coals they contain, or at least three great groups are recognized, namely, (1) anthracite, semianthracite, semibituminous, and bituminous coal; (2) subbituminous coal; and (3) lignite. In addition to delineating the coal fields, the map contains an estimate of the tonnage of coal still remaining in the ground and supposedly available for the future needs of the country.

The making of this estimate, crude though it was, marked an important step in the investigation of the Nation's resources, for it was the first attempt to make a quantitative estimate that would enable the public to calculate the length of time the fuel supply might be available. The writer in making this estimate was painfully aware of its inaccuracies and of the fact that even in such old coal-mining States as West Virginia the data were in such shape that an accurate estimate was impossible. Curiously enough, the data available at that time were much more complete for the Western States than for the Eastern States, and the estimates for some of those States were therefore much more accurate. The figures were put forth at that time with two objects in view—first, to give the public the benefit of the best estimate that the Geological Survey was able to make, and, second, to stimulate the activity of others who were working on the same problems. The publication served both its purposes, for the figures were widely used in the conservation discussions that were then being carried on; and a number of State geologists of the older States began to make estimates of their coal resources, with the result that a much greater volume of information became available and much better estimates could be made. Naturally, the estimates made

by the writer on entirely insufficient data were modified considerably when additional information was obtained; but for a number of years the result stood nearly as it was originally made.

The next attempt to improve upon the old maps of the coal fields and the estimates of the reserves they contained was made by the writer on invitation of the executive committee of the International Geological Congress for its twelfth session, at Ottawa, Canada, in 1913. The International Geological Congress had several years before decided to consider at each session some subject of world-wide interest, particularly some mineral resource in which all countries would be interested. Thus iron ore was considered at the eleventh session, which was held at Stockholm, Sweden, in 1910, and a monograph summarizing the knowledge then existing on this subject was published. The executive committee decided to take up the subject of coal for consideration at the twelfth meeting, at Ottawa, and the results are incorporated in three large volumes of descriptive text and an atlas showing the coal fields of the world. These volumes are a storehouse of information, but their small edition and great cost make their general distribution impossible. Naturally, in a report covering a subject as important as coal and dealing with the fields of the entire world, each country must be treated so briefly that the description may be considered only a short summary.

The report on the coal fields of the United States, exclusive of Alaska, appears by comparison with some others contained in these volumes to be exceedingly brief—too short, in fact, to afford the ordinary reader the information he desires. The essential features of this report are (1) the map, which was brought up to date for this particular purpose, but which is on a scale too small to be of much practical value; and (2) an estimate of the reserves of the different ranks of coal in the several fields, regions, and provinces. This estimate is the most recent one that has been prepared, and it will be accepted with some modifications for the present report.

Although the volumes published by the Twelfth International Congress are monumental and constitute a remarkable achieve-

ment, it was at once realized that they are very inadequate for practical use and that they should be supplemented by more detailed reports on all the countries as soon as possible. Since the publication of the descriptions of the coal fields of the United States in the Geological Survey's Twenty-second Annual Report, in 1902, a large amount of geologic work has been done in the coal fields of this country. The Survey has each year mapped, either in a reconnaissance way or in detail, many thousands of square miles of coal territory in the public-land States of the West, and in addition has been carrying on detailed work in many of the eastern fields. Owing to administrative demands, the work in the West was at first largely of a reconnaissance character, but as time passed it was found necessary to refine methods and to do more careful work, so that in the end sufficient data would be available for a fairly accurate valuation of the land according to the quantity of available coal it contained, a valuation which should be of use to anyone interested in the development of the fields, either as owner, operator, or investor.

In the East the Geological Survey has been or is cooperating with State organizations in the careful survey of parts of the eastern fields. Such work has been carried on in Pennsylvania, Tennessee, and Alabama and is now in progress in Virginia, Illinois, and Kentucky. The State geological surveys of Maryland, West Virginia, Ohio, Tennessee, Iowa, Missouri, and Washington have been active, and good reports have been published relating to the coal in those States.

In view of the great amount of work that has been done since the previous summary was made, it seems opportune to sum up again the existing knowledge regarding the extent and quality of the coals in the various fields. In order to give this report the greatest value and standing, it is proposed, so far as practicable, to have the description of each natural area prepared by the geologist who is most familiar with the field and best acquainted with the local conditions. Not only will this plan be followed within the United States Geological Survey, but State geologists have been invited to prepare the accounts of the coals in their respective States, so that the report may be thoroughly authentic. The State geologists of Maryland, West Virginia, Ohio,¹ Pennsyl-

vania, Tennessee, Michigan, Illinois, Iowa, Kansas, and Washington have agreed to contribute to this plan.

As the reports are to be prepared by many authors, it is impossible to assemble all the material at one time, so the State reports will appear as separates as soon as they are ready and will then be included in the final volume or volumes. Where the coal-bearing areas of a State are made up of a number of isolated fields or regions each isolated area will be treated separately in a signed report, and the State separate will be made up of papers dealing with the fields comprised within the State.

RANKS OF COAL.

METHODS OF CLASSIFICATION.

In this report the word "rank" will be used to designate those differences in coal that are due to the progressive change from lignite to anthracite, a change marked by the loss of moisture, of oxygen, and of volatile matter. This change is generally accompanied by an increase of fixed carbon, of sulphur, and probably of ash. When, however, one coal is distinguished from another by the amount of ash or sulphur it contains, this difference is said to be one of grade. Thus "a high-grade coal" means merely one that is relatively pure, whereas "a high-rank coal" means one that is high in the scale of coals, or, in other words, one that has suffered devolatilization and that now contains a smaller percentage of volatile matter, oxygen, and moisture than it contained before the change occurred.

Within the boundaries of the United States there are all ranks of coal, from the coarse, woody lignite of North Dakota and eastern Montana to the highest rank of anthracite in the fields of eastern Pennsylvania. From the earliest days of coal mining in this country it has been recognized that coals differ greatly, not only in the percentage of ash which they contain, but also in their inherent composition. Although the latter distinction was recognized, little or no attempt was made to determine the reason for the difference or the criteria for fixing the limits of different groups of coals. The first serious attempt in this country to devise a scientific basis for the classification of coal was made by Persifor Frazer, jr., of the Second Geological Survey of

¹ See U. S. Geol. Survey Prof. Paper 100-B, 1918.

Pennsylvania, under the direction of J. P. Lesley. Frazer¹ listed most of the commercial coals of the State and then compared the trade distinctions with the "fuel ratio" (the quotient of the fixed carbon divided by the volatile matter of the proximate analysis). He found that there were in use at that time the rank names of anthracite, semianthracite, semibituminous, and bituminous. He found that in practice the fuel ratios of the coals of the different groups overlapped, but he concluded that these ranks might be established with the following limits:

	Fuel ratio.
Anthracite.....	100 to 12
Semianthracite.....	12 to 8
Semibituminous.....	8 to 5
Bituminous.....	5 to 0

These ranks, with the boundaries fixed provisionally by Frazer, serve very well for Pennsylvania and for the coals of the great Appalachian trough, extending from northern Pennsylvania to central Alabama, but they do not apply to the great mass of western coals, which at that time were of little or no importance. Most of those persons who were instrumental in developing the coal fields of the West originally came from the East, and they carried with them ideas of coal obtained in the eastern fields, which contained high-rank fuel. Not only that, but most of the coals in the Appalachian region and those in the upper Mississippi Valley are of Carboniferous age and hence are very old; but the coals of the West are Cretaceous and even Tertiary in age and hence, when compared with Appalachian coals, are very young indeed. A difference in character was recognized, and as the western coals are generally inferior they were lumped together and called merely "lignite." The term "lignite" is undoubtedly appropriate for many of the low-rank coals of the West, but it is certainly not appropriate for black, shiny coals that show little trace of woody texture and are capable of producing a coke of fairly good quality. Nevertheless such coals were called lignite and relegated to the lowest rank among coals.

Several persons have attempted to devise schemes of classification based upon chemical composition by which a certain coal could be referred to its proper place merely by means of its chemical analysis, but so far no scheme

of this kind has been devised that is applicable to all ranks of coal. Some scheme like Frazer's suits admirably one part of the column but can not be made to fit the other part. Schemes of this kind are so unsatisfactory that the United States Geological Survey has finally decided that it is practically impossible to classify all ranks of coal according to their chemical composition, and that it is necessary to supplement chemical by other criteria. Accordingly, Frazer's scheme, with some necessary modification to make it agree more closely with modern trade practices, has been adopted for the higher ranks of coals, and physical characteristics have been used for the lower ranks. Thus, in the West no one questions that there is coal of the rank of lignite, but it is difficult, if not impossible, to specify what a lignite is in terms of its chemical constituents. Similarly, in the Rocky Mountain region, where the low-rank coals are abundant, there is no question that there is a difference between brown, woody, or amorphous lignite and shiny, black subbituminous coal, but this difference is one that is not clearly defined by available chemical criteria. There is, however, a marked physical difference, although there is no sharp line of demarcation between them. Thus subbituminous coal is black and shiny, whereas lignite is dull and generally woody in texture; subbituminous coal has a greater heating value and carries less moisture than lignite. Altogether the difference between the two is so marked that they are known by different names in the trade, and for that reason, if for no other, they should be classed differently.

In a like manner the distinction between subbituminous and bituminous is not sharp and does not show in a chemical analysis. Subbituminous coal generally carries more moisture than bituminous, but there are so many exceptions to this rule that it has very little value as a means of distinction. There is, however, one marked difference by which they can always be separated, and that is the difference in their behavior under weathering, and as this difference has a marked effect upon their commercial value and use it seems to be a legitimate criterion for separating them into the two ranks, subbituminous and bituminous. The difference in the effect of weathering is due primarily to a difference in the percentage of moisture in the coal, but, as stated above, the

¹ Pennsylvania Second Geol. Survey Rept. MM, p. 143, 1879.

percentage of moisture is variable. Subbituminous coals, however, in general contain more moisture than bituminous coal and on weathering lose their moisture readily. This loss of moisture results in shrinkage and the formation of incipient cracks, which do not conform to the few joint faces but tend to run irregularly. On the other hand, the bituminous coals generally contain a smaller percentage of moisture, so that they shrink very little when suddenly dried. They may be very highly jointed and may fall to pieces readily when mined and handled, but their breakage is due to the inherent weakness of the coal, and the cracks almost invariably correspond with the joint faces.

By using these criteria (part chemical and part physical) it is possible to classify coals and not only to define the general characters of the different groups but to delimit them with considerable accuracy. The United States Geological Survey recognizes the ranks indicated below.

ANTHRACITE.

Anthracite is generally well known and may be defined as a hard coal having a fuel ratio (fixed carbon divided by the volatile matter) of not more than 50 or 60 and not less than 10. Most of it is mined in eastern Pennsylvania, where its peculiar quality is due to regional metamorphism—that is, to the crushing stresses that affected the crust of the earth when the rocks were thrown into the great folds that characterize this region. Small areas of anthracite occur in the West, but generally these coals have been converted to anthracite by the heat of some mass of igneous rock that was thrust into the other rocks while it was in a molten condition. Many such masses take the form of thin sheets, which were forced in between the beds of the other rocks, and consequently for some distance they may lie parallel with the coal beds. If a coal bed is cut by the igneous rock, it may be burned to ashes, made into coke, or converted to anthracite. The product will depend on the presence of air, the intensity of the heat, and the length of time the coal was subjected to the influence of the heated mass. Anthracite is an almost ideal domestic fuel, but it is not well adapted to raising steam unless an absolutely smokeless coal is needed. Many people believe that anthracite has greater heating value than any of the other ranks, but this is not true, as can be seen by a comparison of

analyses given on page 31, and by reference to figure 1 (p. 8). Largely on account of its low heating power anthracite is not an economical fuel for raising steam or for use in general manufacturing.

SEMIANTHRACITE.

Semianthracite is also a hard coal, but it is not so hard as true anthracite. It is high in fixed carbon, but not so high as anthracite. It may be defined as a hard coal having a fuel ratio ranging from 6 to 10. The lower limit is uncertain, as it is difficult to say where the line should be drawn to separate "hard" from "soft" coal and at the same time to divide the two ranks according to their fuel ratio. Some hard coals of the anthracite type have a fuel ratio as low as 6.5 or 7, whereas some of the soft coals have a fuel ratio as high as 7 or perhaps more. Much of the apparent difference in the fuel ratios of coals is due to differences in the methods used in the laboratory for determining the volatile matter. If gas is used as a fuel the results in different laboratories or at different times in the same laboratory do not always coincide. The best modern practice is to use the electric furnace for heating the coal, and all determinations of volatile matter in Government laboratories are now made in this manner. All analyses made at the Pittsburgh laboratory that are numbered 17000 or higher were made in the electric furnace and show a lower percentage of volatile matter than analyses having lower laboratory numbers. For the reason stated it is probable that fuel ratio alone can not be depended upon to separate these two ranks, but that physical properties also may have to be taken into consideration. The change of ordinary soft coal to semianthracite is due to the same causes that produced anthracite, except that the process has not been carried so far in semianthracite, possibly because the action has not been so intense. There is very little semianthracite in this country, so it is only a small factor in the coal trade. Such semianthracite as is mined usually reaches the consumer as "anthracite" and is masquerading under false colors.

SEMITBITUMINOUS.

The name "semitbituminous" is exceedingly unfortunate, as literally it implies that this coal is half the rank of bituminous, whereas it is applied to a kind of coal that is of higher rank than bituminous—really superbituminous.

According to the best modern laboratory practice semibituminous coal may be defined as coal having a fuel ratio ranging from 3 to 6. Its relatively high percentage of fixed carbon makes it nearly smokeless when it is burned properly, and consequently most of these coals go into the market as "smokeless coals." The best coal of this type has a heating value greater than that of any of the other ranks and is consequently best adapted to raising steam and to general manufacturing that requires a high degree of heat. It is regarded as the best coal for steamship and especially for naval use, as it is nearly smokeless and requires less bunker space per unit of heat than other coals. The coal is generally minutely jointed and is therefore tender and friable. In fact, it is so friable that in mining a large percentage of fine coal is produced, and in transportation many of the lumps are broken to pieces, so that by the time it reaches the consumer, especially if it has been transshipped, it is generally in small pieces. This fineness is by many regarded as detrimental, because the public is accustomed to lump coal that will stand transportation without crushing, but when this coal is used with mechanical stokers and with a grate adapted to its use its fineness is not disadvantageous. The great bulk of this kind of coal is in the eastern fields, but some is found in the West, where it has been subjected to a slight amount of regional metamorphism or has been heated by some igneous mass.

BITUMINOUS.

The term "bituminous," as generally understood, is applied to a group of coals having a maximum fuel ratio of about 3, and hence it is a kind of coal in which the volatile matter and the fixed carbon are nearly equal; but this criterion can not be used without qualification, for the same statement might be made of subbituminous coal and lignite. Bituminous coal is only slightly affected chemically by weathering unless it is exposed for many years, and then, although it consists of small particles, each particle is a prismatic fragment, whereas coals of lower rank break into thin plates parallel with the bedding.

Although the definition given above might not indicate that the group of coals of bituminous rank is a large one, yet it includes a great variety of coals, which really have little in common. Many attempts have been made to subdivide this great group, but so far no scheme

proposed has met with general approval. Many of the better coals of this group will coke, but coking coals are not limited to the bituminous rank, for some of the best coke made in the United States is produced from semibituminous coal. Not only is the upper limit of the coking group uncertain, but the lower limit is equally difficult to determine. If the coking property had some definite relation to the chemical composition of the coal as it is at present determined there might be some hope of establishing by chemical analysis a class of coking coals, but no one can say just why a coal will coke, so a test in an oven is required to determine whether or not it possesses this property.

Gas coals have been in great demand, and such coals must be high in volatile matter, so as to make on distillation a large volume of gas; and as this gas must be relatively free from sulphur the coal from which it is made must contain very little of that element. In recent years the making of gas for illuminating and heating has undergone a great change, water gas largely taking the place of gas distilled from coal; and as this gas requires no particular quality of coal, the demand for "gas coals" has been greatly reduced and probably will disappear.

Cannel coal is very rich in volatile matter, is generally high in hydrogen, and therefore burns with a great heat and a long flame. It is essentially a gas-making coal and in the early days was used extensively for this purpose, as well as for the distillation of oil. As a source of oil it could not compete with petroleum derived from wells, and soon after oil was discovered in the earth in 1859 the business of distilling oil from coal in this country was discontinued. Cannel coal owes its richness to the fact that it is composed almost entirely of the spores, spore cases, seed coats, and resinous or waxy products of such plants as lived at the time of the existence of the coal swamps. In such swamps, as in those of to-day, there was doubtless in places open water, into which the spores and seed cases floated and, becoming waterlogged, sank to the bottom and in time produced cannel coal. The absence of woody material in such coal gives it a regular texture and grain that are not found in any other coals. As a result, it breaks like glass, with a conchoidal or shell-like fracture, and owing to its richness in inflammable material the best of it will ignite readily when a small splinter of it is held in contact with a lighted match. As the nature of cannel coal is due to the kind of material of

which it is composed, it follows that there may be all kinds of cannels, corresponding in a general way with the various ranks of coals. Ashley¹ has recently proposed the following classification of canal coal:

1. Subcannel coal:
 - (a) Brown subcannel, of brown coal or lignite rank.
 - (b) Black subcannel, of subbituminous rank.
2. Cannel coal, of bituminous rank:
 - (a) Boghead cannel (fuel ratio less than 0.5).
 - (b) Cannel (fuel ratio between 0.5 and 1).
 - (c) Lean cannel (fuel ratio more than 1).
3. Metacannel coal:
 - (a) Semibituminous metacannel.
 - (b) Semianthracite metacannel.
 - (c) Anthracite metacannel.

Cannels which are of the rank above bituminous have lost their original richness and therefore do not deserve to be called cannels.

Other kinds of coal, such as "block" and "splint," are recognized in the trade, but the characteristics of these coals are physical and are found in only a small group of coals. Some of the "block" and "splint" coals are very hard, almost as hard as anthracite, but they are generally woody in texture and contain much mineral charcoal. They are valuable coals in the market, but usually their development is so local that they are not of much importance in a general classification of coal.

As the great group of bituminous coal includes all grades from the poorest western bituminous coal to the highest-rank coal in the Appalachian region, exclusive of the semibituminous coal, the writer has, for convenience, divided the group and represented it on the general map of the coal fields of the United States in two colors—one indicating all coals having, in the air-dried sample, a calorific value (in British thermal units) of more than 12,500, and the other indicating all bituminous coals having, in the air-dried sample, a calorific value of less than 12,500. This is a practical separation according to heating value, which, after all, is the principal criterion for determining the relative values of coals.

SUBBITUMINOUS.

The term "subbituminous" is adopted by the Geological Survey for what has generally been called "black lignite," a term that is ob-

jectionable because the coal is not lignitic in the sense of being distinctly woody, and because the use of the term seems to imply that this coal is little better than the brown, woody lignite of North Dakota, whereas many coals of this rank approach in excellence the lowest grade of bituminous coal. Subbituminous coal is generally distinguishable from lignite by its black color and its apparent freedom from distinctly woody texture and structure, and from bituminous coal by its loss of moisture and the consequent breaking down or "slacking" that it undergoes when subjected to alternate wetting and drying. As the percentage of moisture is an important matter in buying and shipping coal, and as the slacking on exposure to the weather makes it necessary to ship in box cars and to guard carefully against spontaneous ignition, there is a great commercial difference in these two kinds of coal which the Geological Survey has recognized by putting them in different ranks. Despite the many drawbacks in the shipment and use of subbituminous coal it has found a ready market in much of the western country, because it is a very clean domestic fuel and ignites with little difficulty.

Subbituminous coals differ considerably in chemical composition and in physical appearance. Some are banded like much of the bituminous coal, and some are essentially cannel in physical and chemical make-up. In general, the Cretaceous and younger coals of the West contain a smaller percentage of sulphur than the older coals of the East, and as some of them are high in volatile matter they would doubtless be excellent coals for making gas, either illuminating gas or producer gas for generating power.

LIGNITE.

The term "lignite," as used by the Geological Survey, is restricted to those coals which are distinctly brown and either markedly woody or claylike in their appearance. They are intermediate in quality and in development between peat and subbituminous coal. As the moisture of lignite as it comes from the mine generally ranges from 30 to 40 per cent, its heating value is low; and the consumer can not afford to pay freight for any great distance on so much water. Also it parts with much of this moisture very readily when exposed to the weather and so falls to pieces or slacks much

¹ Ashley, G. H., Cannel coals in the United States: U. S. Geol. Survey Bull. 659, p. 10, 1917.

more readily and completely than subbituminous coal. On this account it is more likely to ignite spontaneously and must be handled even more carefully than subbituminous coal and stored in a place where it will not be exposed to alternate wetting and drying. Lignite is mainly marketed near the mine, as a domestic

fuel, but at a few places in North Dakota and Texas it is shipped to near-by towns and used for general manufacturing purposes.

At the Government testing plant at the St. Louis Exposition North Dakota lignite was found to be an excellent fuel for making producer gas, and probably in the future it will be

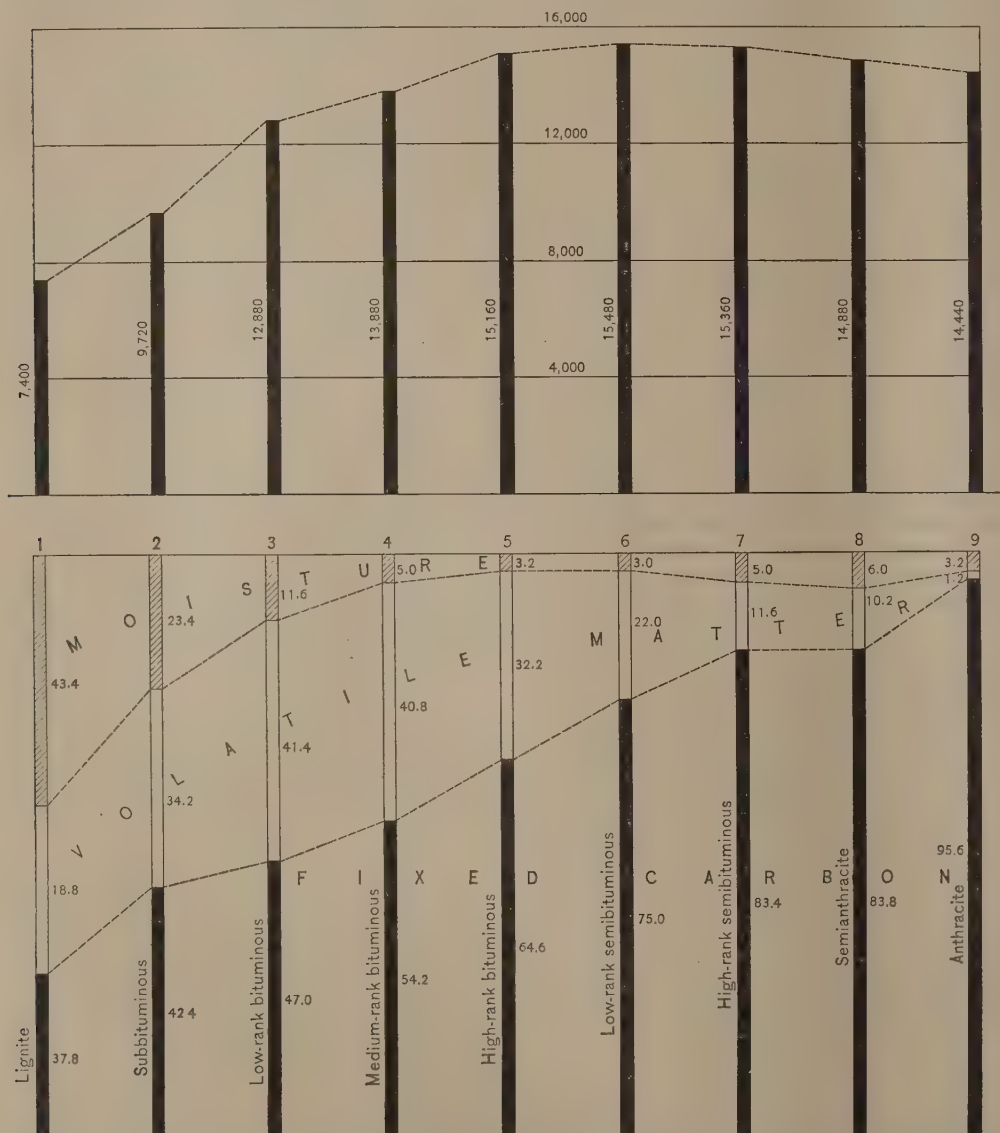


FIGURE 1.—Diagrams showing the chemical composition and heat efficiency of the several ranks of coal. Upper diagram: Comparative heat value of the samples of coal represented in the lower diagram, computed on the ash-free basis. Lower diagram: Variation in the fixed carbon, volatile matter, and moisture of coals of different ranks, from lignite to anthracite, computed on samples as received, on the ash-free basis.

much more largely used for producing power than it has been in the past. Just how this will be accomplished is difficult to determine, but it is possible that large producer plants may be erected at the mines and the lignite converted into electric energy and delivered by long-distance transmission lines to towns within a radius of 200 miles or to the railroads in this region or in contiguous territory. Lignite has recently been used in powdered form, and it may possibly be better utilized in this way. As some of the Texas and Arkansas lignites are in effect undeveloped cannel coals, it seems possible that when the supply of petroleum is much less than the demand, the lignite may be used for the distillation from it of oil and the formation of various by-products that are now obtained in Scotland from oil shale. Lignite can also be manufactured into hard briquets, which make an excellent fuel, but so far the cost of manufacture has been prohibitive.

COMPARISON OF THE DIFFERENT RANKS.

Figure 1 is a graphic representation of the proximate chemical composition of the various ranks of coal and of their heat-producing values. The lower diagram shows the fairly regular increase in fixed carbon from lignite to anthracite, though it must not be supposed that the lines for all coals are as simple as those shown in the diagram. The analyses upon which the diagram is based are, however, actual analyses selected from those given in the table at the end of this introduction. No. 1 represents the analysis of a typical North Dakota lignite which as it comes out of the mine has a moisture content of about 40 per cent. It also contains about 5.5 per cent of ash, but as ash varies irregularly without regard to the rank of the coal the analysis has been recalculated to the ash-free basis, thus eliminating ash from consideration. All the other analyses have been similarly recalculated. No. 2 represents a subbituminous coal from Wyoming, having a moisture content of 23.4 per cent; Nos. 3, 4, and 5 represent various ranks of bituminous coal, the lowest one being from Indiana, the second from Ohio, and the third, or highest, from the Pittsburgh district of Pennsylvania; Nos. 6 and 7 represent semibituminous coal from the Windber district of Pennsylvania; No. 8 represents semianthracite; and No. 9 repre-

sents some of the best anthracite of the Pennsylvania region. The diagram shows clearly that the fixed carbon increases very markedly from lignite to anthracite; that the moisture of the higher-rank coals is small and about the same quantity in each, but increases rapidly from medium-rank bituminous coal to lignite; and that the greatest development of volatile matter is not at either end of the series but in the lower ranks of bituminous coal.

The upper diagram represents the heat value of the same coals on a similar ash-free basis. There is a very general misconception regarding the heat value of anthracite as compared with that of lower-rank coals. Many persons think that because anthracite commands a higher price it must necessarily be a better heating coal than the soft varieties, but this diagram shows conclusively that it is not and that the best coal for heat production is No. 6, or low-rank semibituminous coal. Anthracite commands a higher price than soft coal because of its suitability for domestic use and because of its freedom from smoke, soot, and waste.

From the diagram it might be inferred that the heat value of a coal depends directly upon the amount of fixed carbon that it contains, but this can not be true, for the heat value of pure carbon is only 14,580 British thermal units,¹ whereas coal No. 6 has a heat value of 15,480 British thermal units. Coal derives its heat value mainly from two elements, carbon and hydrogen, the carbon having a heat value of 14,580 British thermal units and the hydrogen a heat value of 62,000 British thermal units.¹ The greater heating power of the low-rank coals as compared with anthracite is due to the fact that these coals contain a considerable quantity of available hydrogen,² which when burned produces a much greater heat than the same weight of carbon.

Either diagram well illustrates the slight value of lignite as compared with the higher-rank coals and makes it possible to understand why Pennsylvania and West Virginia coal can be hauled by rail to Lake Erie,

¹ Richards, J. W., *Metallurgical calculations*, p. 16, 1906.

² W. S. Parr (The composition and character of Illinois coals: Illinois Geol. Survey Bull. 3, p. 37, 1906) defines available hydrogen as follows: "By available hydrogen is meant that part of the hydrogen content which is free to enter into combination with oxygen for the production of heat, as distinct from that hydrogen present which already has * * * the necessary equivalent oxygen for the formation of water, and consequently [is] noncombustible."

shipped by vessel to Duluth or Superior, hauled 400 or 500 miles inland, and then sold in direct competition with lignite mined in the vicinity.

CLASSIFICATION OF THE COAL AREAS OF THE UNITED STATES.

For convenience in describing the areas underlain by coal-bearing rocks, some scheme of names and classification of areas is essential. The plan adopted is shown in Plate I, the large map in the pocket of this report. Although coal areas might be subdivided or combined indefinitely, the Geological Survey recognizes four classes, which, beginning with the smallest, are called district, field, region, and province.

COAL DISTRICT.

"Coal district" is a term applied only to developed coal areas. It is already in common use in the trade for an area in which mining has been developed around a fairly definite center, but it also has been loosely used as synonymous with "coal field." A district is generally small, and the term is restricted to areas in which mines are developed continuously on a given bed or beds, and the coal is generally known in the trade by some distinguishing feature, such as a trade name, or by some physical characteristic upon which it is advertised and sold. Districts are generally named from the leading town in them, or from the town at which mining first started or which first achieved distinction in producing this particular kind of coal. From the very nature of the case districts are small, but it is not possible to set definite limits to the area that should be classed as a district.

COAL FIELD.

A coal field is an area of coal-bearing territory next larger than the district. Its recognition is based less upon trade practices and uses than that of a coal district, and therefore it has more of the natural features to characterize it. The term "field" is at present used very loosely, and in many ways it is not advisable to attempt its close restriction. As used by the Geological Survey, it is applied to an area generally larger than a district, but still to a well-defined compact area. In this respect it differs from "region," the term for the next higher division. Small areas or basins that are separated from one another or from the main coal area are called fields, especially if their coal is of fairly

uniform composition and value. "Field" is also applied to a certain area which has become prominent because of the kind of coal it produces, but which is not necessarily limited to certain centers of production. Some of the best-known fields of this class are the Pocahontas field of Virginia and West Virginia, the New River field of West Virginia, the Georges Creek field of Maryland and West Virginia, and the Windber field of Pennsylvania. These fields have definite outlines, corresponding with the extent of the bed or beds of coal upon which the field was established or with the limits of coal of a certain quality that influences its sale and use. In large areas of coal-bearing rocks, like that of Illinois, there are many districts or centers of production, but it is also necessary to recognize the larger divisions corresponding with those just mentioned. In Illinois, however, there are no well-defined limits depending on quality of coal or upon natural features, for the region is fairly well and uniformly developed and the quality of the coal does not vary markedly throughout the State. Under such conditions it would be of little value to mark off definite fields, and they would not be used by many; therefore it has been decided that in such areas fields may be recognized as a matter of convenience and hence may vary in different reports, for a division that would be convenient to one person would not necessarily suit the needs of another. It is therefore proposed to consider such a State as Illinois as made up of an indefinite number of coal fields, the limits of which should be defined by the person making the subdivision, and the limits made by one person should not necessarily agree with or control those made by another.

COAL REGION.

As a matter of convenience, coal fields may be grouped into larger divisions called "regions." Such grouping is generally designed to bring together coal fields that have some feature or features in common, thus enabling them to be considered as a whole or separately as the problem may demand. The most striking subdivision of a region is in Colorado and New Mexico, where the great area of coking coal in the eastern parts of these States extends across the line from one State into the other. The Colorado portion is well known as the Trinidad field and the New Mexico por-

tion is equally well known as the Raton coal field. Both names are appropriate and needed, but in many discussions it is necessary to consider them together as a unit, for they are as nearly a unit as it is possible for two coal fields to be. For this reason they are here considered together as the Raton Mesa coal region. Likewise, many other areas are essentially a combination of fields and therefore should properly be classed as regions. Good examples are the anthracite region of Pennsylvania; the western coal region in Iowa, Missouri, Kansas, Oklahoma, and Arkansas; and the numerous deep basins of the Rocky Mountain States.

COAL PROVINCE.

As fields are grouped into regions, so regions are grouped into much larger divisions, called "provinces." These, as shown on the accompanying map, are the Eastern province, Interior province, Gulf province, Northern Great Plains province, Rocky Mountain province, and Pacific Coast province. The grouping into provinces is made largely for convenience in considering broad questions of geologic age, geologic structure, quality of coal, and transportation. In a province, as in a smaller division, there is a certain amount of unity in the physical features of the coal fields of the province or in the quality of the coal. Some provinces contain all ranks of coal, and the fields are grouped together because of their geographic positions, their structural features, or the age of the coal beds.

THE COAL AREAS.

EASTERN PROVINCE.

The Eastern coal province contains probably nine-tenths of the high-rank coal of the country. It is considered as made up of the anthracite regions of Pennsylvania and Rhode Island, the Atlantic coast region of Virginia and North Carolina, and the great Appalachian region, which embraces all the bituminous and semibituminous coal of what is generally known as the Appalachian trough.

The Rhode Island anthracite region, although known since 1760, is of little economic importance, for the coal has never been mined for a long period on a commercial scale, and judging from its composition and the metamorphism of

the surrounding rocks, it seems doubtful whether it will ever have more than a local value, if it is worked at all. The coal is more highly metamorphosed than that of Pennsylvania, so that some of it is mined and sold as graphite. It also carries a large percentage of ash, which makes it an expensive fuel to mine and to use.

The Pennsylvania anthracite coal region is so well known that it needs little mention here. It is described in detail in the chapter on the coal fields of Pennsylvania. In the trade generally the anthracite region is considered as made up of four fields known as the Northern, Eastern Middle, Western Middle, and Southern. In 1918 these four fields together produced 98,826,084 short tons, or 99.9 per cent of the anthracite mined in the United States.

The Atlantic coast region is of very little practical importance at the present time, for its coal beds are worked either not at all or on a scale so small as to be negligible. The Richmond field or basin, however, has the distinction of being the scene of the first development of bituminous coal in this country, mining having been begun there in 1787. The coal is generally of high rank, some being semianthracite; but the conditions of mining are not good, and the coal can not at present compete with the better coals of the Appalachian region.

The Appalachian region is the greatest storehouse of high-rank coal in the United States, if not in the whole world. This near-by supply of high-grade fuel has constituted the foundation of the development of the blast furnaces, the great iron and steel mills, and the countless manufacturing enterprises of the Eastern States. The Appalachian region is a compact area of coal-bearing rocks, which in general lie in a deep trough. The trough shape is well marked in its northern part, and the middle line or axis runs nearly through Pittsburgh and thence southwestward to the vicinity of Huntington, W. Va., on Ohio River. The lowest coal bed, if present in the deepest part of the trough, would be about 2,000 feet below the surface. The rocks in this great trough are thrown into a large number of minor wrinkles or anticlines (upfolds), especially on its southeastern side. These small folds generally bring to the surface the harder rocks just beneath the coal-bearing beds, and consequently they form ridges or mountains, as they are called in Pennsylvania and West

Virginia. These die out toward the southwest, but they exert a marked effect upon the coal beds exposed at the surface as far south as Kanawha River. In southern Virginia and Kentucky the trough flattens decidedly, and in consequence the coal beds in its middle are not so deep, but their outcrops cover a wider territory. In Tennessee the trough is scarcely apparent and the coal-bearing rocks appear to be nearly horizontal but are broken up by several small folds similar to those noted in the northern part of the region. The effect, however, is very different, for owing to the flatness of the rocks the streams have cut away the up-bending folds, leaving great longitudinal valleys instead of anticlinal ridges, and narrow, flat, intervening troughs of coal-bearing rocks. The same kind of structure, except that the troughs are more pronounced, is seen in the coal fields of Alabama, but toward the southwest the rocks gradually descend, and near Birmingham they begin to pass beneath the later rocks (Cretaceous) that were deposited on the Gulf Coastal Plain. This cover becomes deeper and deeper toward the southwest, until, in the vicinity of Tuscaloosa, the coal-bearing rocks disappear and nothing is in sight but the soft sand and clay of the younger formations.

Along the western margin of the Appalachian region the coal beds dip very slightly toward the east and there are no outliers of any consequence, but on the eastern margin the rocks are much more severely folded and there are many synclines (downfolds), which, by the cutting back of the river valleys, have been separated from the main area and now form isolated natural fields. Among the most prominent of such outliers on the east side are the Broad Top field, in central-southern Pennsylvania; the Georges Creek and Upper Potomac basins, in Maryland and West Virginia; the Lookout Mountain field, in Georgia and Alabama; and the Coosa and Cahaba fields, in Alabama. There are also a number of long, narrow outliers in southern Virginia, which properly do not belong with the Appalachian region but which for convenience will be so classed. These fields contain thin and irregular coal beds of Mississippian ("Lower Carboniferous") age. They are the only coals of this age and are the oldest coal beds of commercial importance in the country. Many of them are of high rank, but on account of their irregu-

larity and impurity they have not been extensively developed.

The coal of the Appalachian region is generally of high rank but shows considerable variation, mainly in an east-west direction. In the reports of the Second Geological Survey of Pennsylvania it was clearly pointed out that the percentage of fixed carbon in the coals of that State increases from west to east, and also that the volatile matter decreases in the same direction. The result of this progressive change is that the coals on the eastern margin of the region are of much higher rank than are those on the western margin. White¹ has recently shown that the same progressive change is characteristic of the entire region, and he has drawn contours of equal percentages of fixed carbon, showing the change. The well-known fact that the fields of semibituminous coal are limited to the eastern margin of the region accords with this progressive devolatilization of the coals toward the east. Even along this margin they are irregularly disposed, and White has shown that this irregularity is due to variation in the pressure exerted on the coal-bearing rocks at the time of the great movement which folded the rocks of the Appalachian region. As this thrust was transmitted through broken and folded rocks it acted irregularly; in places the movement was taken up by the folding and faulting of the rocks, and in other places the thrust was transmitted direct to the coal-bearing rocks, and materially affected the quality of the coal. As the coals are the softest rocks involved in the thrust, they were transformed according to the intensity of the pressure, the transformation being greatest along the east side of the region, where the thrust was most severe, and least along the west side, where the thrust was least. Two other elements that materially affect the quality of the coal of a field or region are the sulphur and the ash. The variations in the quantity of these substances are due to original differences in the conditions under which the coal was laid down and to conditions that permitted mineral-bearing waters to circulate through the coal bed since it was formed. These conditions can not be determined, so the variations in composition due to these factors can not be foretold to any great extent.

¹ White, David, Some relations in origin between coal and petroleum Washington Acad. Sci. Jour., vol. 5, pp. 189-212, 1915.

During the deposition of the coal beds the Appalachian region was doubtless a great swampy country near sea level, but even then it appears to have been in the form of a basin, whose deepest part was in western West Virginia. On account of this depression there was probably open water here, at least during part of the time when the coal beds were being deposited, for the coals are generally absent from this part of the region, as is shown on the map (Pl. I, in pocket). These beds, if present, would be deeply buried, but their absence has been revealed by deep drilling done to find oil and gas.

INTERIOR PROVINCE.

The Interior province includes all the bituminous coal fields and regions near the Great Lakes, in the Mississippi Valley, and in Texas. It is made up of four distinct regions—the northern region (Michigan); the eastern region (Illinois, Indiana, and western Kentucky); the western region (Iowa, Missouri, Kansas, Oklahoma, and Arkansas); and the southwestern region (Texas).

As these regions, except one, are not near mountainous uplifts, the coals are of medium rank, for little pressure has been exerted upon them, and their change or devolatilization has been only such as resulted from the long-continued pressure of the overlying rocks. This statement is eminently true of the northern and eastern regions, the Iowa and Missouri portions of the western region, and the southwestern region; but as the southern part of the western region is near or a part of the mountainous area of uplifted rocks in Arkansas, the coal beds have been materially affected. They have been devolatilized to about the same extent that the Appalachian coals have been devolatilized by the great pressures that folded the rocks of the Appalachian Valley. The Ouachita disturbance changed the coal of Arkansas to semibituminous coal, or even to semi-anthracite, and the pressure has been effective as far west as a point about 50 miles within Oklahoma. Beyond this point the coal has not been converted into semibituminous coal but has been considerably altered, so that to-day it is regarded as superior to the coals of adjacent fields. The pressure also has devolatilized the coals farther north, in Kansas, changing them to coals of considerably higher rank than the

coals of the region farther north. The coals of the northern part of this province have a large moisture content, which of course produces low heating value and a generally poor coal.

The northern and eastern regions are in the form of wide, generally shallow basins in the coal-bearing rocks, the deepest parts of which lie near their centers, toward which the beds dip lightly from the margins. The coal-bearing rocks in the western and southwestern regions do not lie in basins, or rather they constitute the eastern margin or rim of the greatest basin on the continent—the basin of the Great Plains. Throughout Iowa, Missouri, Kansas, Oklahoma, and Texas the coal-bearing rocks dip lightly westward and pass beneath the later rocks of the Great Plains. They emerge in the Rocky Mountains, on the west side of the Great Basin, but here the rocks of this age are not coal bearing, and no one knows where the change occurs from one to the other. The passing of the coal-bearing rocks under the cover of the later rocks of the Great Plains is shown on the map by the dotted pattern in the light tint. That part of the western region which lies in Arkansas is merely an eastern outlier in which the rocks are greatly folded, and in which the coals are therefore much devolatilized and improved in rank; but this area is still connected with the main region to the west.

Although the coal of the Interior province as a whole is not equal in quality to that of the Eastern province, it is very extensively mined and is used for heating and for generating power in the many cities and towns of the Mississippi Valley and the Great Lakes. In fact, the presence of these extensive coal fields in near proximity to the rich agricultural lands of this country and to the avenues of transportation—railroads, lakes, and rivers—has been largely instrumental in developing the great manufacturing centers of Chicago, St. Louis, and Kansas City and has been an important factor in the development of the railroad systems that gridiron this fertile country in all directions.

GULF PROVINCE.

The Gulf province is at present of slight commercial importance. The coal is mostly lignite, and it has been mined at only a few localities in the State of Texas. The same

kind of lignite occurs in Arkansas, Mississippi, and Alabama; but, owing to the presence of high-rank coal near by in the fields of Arkansas, western Kentucky, and Alabama, it has not been prospected except in a few areas. The lignite is contained in rocks of Eocene (early Tertiary) age, generally sandstone and clay, that are so soft as to make mining difficult and expensive.

The old idea that lignite is of recent formation and is of low rank because of that fact is generally true, but there are many exceptions. Some of the most valuable coal beds in the Western States are of the same age as the Texas lignite, yet they are of high rank. A study of the coal fields of the United States shows clearly that, although age is a factor in the alteration of coal, it is generally not the principal one. The controlling factor is the presence or absence of disturbances in the rocky crust of the earth, either in the coal field or close to it. Thus in the lignite fields of Alabama, Mississippi, Arkansas, and the northern part of Texas there have been no mountain-making disturbances since the lignite was formed. It may be said that the region is in its native condition; but near the Mexican border, in the vicinity of Laredo and Eagle Pass, the coal has been changed to a higher rank by the uplift of the Sierra Madre Oriental, of Mexico, which lies only a short distance to the southwest. Similarly, in Washington and in other States of the West the disturbances which have produced the mountains have so changed the coal that, instead of being lignite, it is now bituminous coal or even anthracite. The lignite of northern Texas and southern Arkansas is of better quality than that of the central part of Texas, the difference being due probably to the different conditions under which it was deposited. The lignite in the southern part of Texas seems to have been formed largely of trees and stems, which are clearly visible in the lignite to-day; but in the northern part of the State there appears to have been open water in which the accumulation of organic matter consisted mostly of spores, seeds, and spore cases that grew on the plants in the surrounding areas. Such wood as fell or drifted into the water decayed, for the most part, so that its resin content fell to the bottom, there to mingle with the spores and other resistant detritus. The result is that this lignite

is very rich in bituminous matter; it is sub-cannel coal or cannel coal in the process of formation. The rocks containing the lignite dip gently toward the Gulf and pass under younger rocks. These effectually conceal the Eocene rocks and the beds of lignite, but it does not seem probable that the lignite extends very far in this direction, for when the lignite was formed this area was a low coastal plain, which sloped gently to salt water, and as the swamps were limited to the land area they were probably not very wide.

NORTHERN GREAT PLAINS PROVINCE.

The Northern Great Plains province includes all the coal fields in the Great Plains east of the Front Range of the Rocky Mountains. In this province the rocks generally lie flat or are but little disturbed, and in consequence the coals are of low rank, being either lignite or subbituminous, except in a few of the basins near the mountains, where the forces that caused the upheaval have locally changed the coal to higher rank. This progressive increase in rank toward the regions of mountain making is apparent in this province, as may be seen not only by comparing the coals of the different fields or basins, but by comparing many of the coals within a basin, region, or field.

The largest coal region in this province is the Fort Union region, lying in North Dakota, South Dakota, Montana, and Wyoming. The northeastern part of this region consists of a very broad, flat basin, in which the dips on the margin are so slight as to be perceptible only by the aid of a level. The southwestern extremity is more sharply folded, consisting of a rather broad, flat trough lying between the great upfold of the Bighorn Mountains on the west and the lower dome of the Black Hills on the east. Although the Fort Union region incloses the Black Hills in a great semicircle the coals there show little or no effect of that uplift, but they do show a decided change toward the Bighorn Mountains. Thus throughout North and South Dakota and northeastern Montana the coal is a brown woody lignite with a moisture content, as it comes out of the ground, of 40 to 45 per cent, but in the vicinity of Miles City, Mont., the brown lignite begins to lose its woody structure and to take on the black color and the general appearance of a subbituminous coal. The change is, however, very gradual,

and throughout a zone 15 or 20 miles in width can be seen the mingling of the two types; probably no two geologists would agree on the position of the line marking the place where one leaves off and the other begins. The subbituminous coal in southern Montana is of very poor quality, but farther southwest, in Wyoming, it improves until it reaches its best development in the vicinity of Sheridan, Wyo., where it has been mined extensively for a number of years. At this place the moisture content of the coal as it comes from the mine is only about 25 per cent, and for this reason alone its heating value is 30 per cent higher than that of the lignite of North Dakota.

Many of the coal beds in the Fort Union region are thick, those that are worked measuring from 3 to 40 feet. In almost every section of land that has been carefully examined there have been found a number of thick beds, so that the quantity of unmined coal or lignite in this region is very great.

The lignite and subbituminous coal of this region, as well as that of most of the other fields and regions of this province and of the Rocky Mountain province, ignite easily, and many of them have been burned along the outcrop. Some of the beds are now on fire and are objects of curiosity to those who are not familiar with the country. The heat generated by the burning has been in many places so intense as to partly fuse the overlying shale or sandstone, producing a peculiar, slaglike material of a deep-red color. In other places the heat has not been sufficient to melt the adjacent rock but has changed its color to a dull red, resembling that of brick. Red hills and ridges, whose color is due to the burning of the coal, are common in the western fields and are considered indications of the former presence of coal beds. The depth to which burning extends depends on the depth of cover, for the coal can burn only to depths to which air is accessible; consequently burning is generally limited to a few hundred feet. This low-rank coal also ignites easily in mining, and many mines have had to be permanently abandoned because of fires.

There is very little mining in the Fort Union region, because the inhabitants are engaged chiefly in raising stock and farming, and there are no large towns or cities in which much manufacturing is carried on. The absence of

manufacturing explains in part the lack of mining, but the greatest drawback to the establishment of mines is the poor quality of the lignite, which precludes its use as a fuel in many manufacturing processes. Although winter in this region is very severe and fuel is in great demand, those who have attempted to mine the lignite have found difficulty in marketing it in competition with high-rank Pennsylvania and West Virginia coal shipped over the Great Lakes and thence by rail to the lignite region. In the southwest end of the region, where the coal is of the subbituminous rank, the operators have been more successful in opening mines and in building up a large trade. The two centers of production are Sheridan and Glenrock, near Douglas, Wyo., and the coal mined around these centers finds a ready market, especially in the north, where better coal is difficult to obtain.

Although the coal in that part of the Fort Union region which surrounds the Black Hills shows little effect of the upheaval that formed the hills, the coal found immediately on the flanks of the uplift shows a decided improvement in quality as a result of the formation of the Black Hills. The region containing this high-rank coal is rather small and lies entirely on the west side of the uplift. The coal is contained in rocks of Lower Cretaceous age and corresponds with the coal mined at Sand Coulee, south of Great Falls, Mont. The principal center of development is at Cambria, north of Newcastle, Wyo. The coal is of bituminous rank and has been used largely in the manufacture of coke. The coal bed, however, has many partings of shale, and both the coal and coke therefore contain so high a percentage of ash that they can not easily compete with the lower-rank coals of adjacent regions.

Coal like that of the Sheridan district, though perhaps of somewhat better quality, is rather extensively mined in the Bull Mountain field, on Musselshell River. This field is comparatively new, its development dating from the building of the Pacific coast extension of the Chicago, Milwaukee & St. Paul Railway, in 1908. The field is small, having an area of about 1,000 square miles, but it includes a number of beds, some of which attain considerable thickness. The coal is of the same geologic age as the lignite in the eastern part of Montana and in North Dakota, but here it has been changed to

a high-rank subbituminous coal, about equal to the best subbituminous coal of the Northern Great Plains and Rocky Mountain provinces.

In the Milk River valley and along Missouri River south of the Bearpaw Mountains there is considerable coal, but the beds are generally thin or are only locally expanded into lenses thick enough to be of present commercial value. Another obstacle to the development of these fields is the deep cover of glacial drift, which, north of Missouri River, makes the tracing of coal beds and their exploitation very uncertain. The coal is generally subbituminous, but in places it is of the bituminous rank.

The highest-rank coal in this part of the province is that in the Great Falls and Lewistown fields, of Cascade and Fergus counties, Mont. This coal is bituminous and for a number of years was mined and coked at Belt to supply the copper smelters at Anaconda. The coking coal is limited, however, to this locality, and the manufacture of coke from it was discontinued several years ago. The coal contains a large percentage of impurities and has therefore not met with as ready a sale as was expected when the mines were first opened. The coal is mined somewhat extensively for steaming and domestic use in the region round about the mines.

Farther south, in Colorado, the next field of consequence is generally known as the Denver region. This region extends from the Wyoming line southward as far as Colorado Springs. The coal is extensively mined northwest of Denver and to some extent at Colorado Springs. It is subbituminous and finds a ready market in and about Denver and Colorado Springs as a domestic fuel. The coal northwest of Denver is mined along the upturned edge of the coal-bearing rocks at the foot of the mountains, and here it is a fairly good coal of its class; but that at the southern end of the region appears not to have been so greatly affected by the uplift of the mountains and is consequently of much lower rank.

The Canon City field is a small basin of coal-bearing rocks in the great reentrant of the mountain front at Canon City. Owing to its proximity to the mountain uplift the coal has been changed to the bituminous rank, but it carries so high a percentage of ash that its sale in competition with cleaner coals is difficult, especially for domestic use. In the early days

of railroad building in Colorado (about 1878) there was keen rivalry between the Denver & Rio Grande and Santa Fe railroads for the possession of this field as a source of locomotive fuel, but although both roads gained access to it the coal has been somewhat disappointing, as its heavy ash content makes it an undesirable fuel for this purpose. Many mines have been opened, and the coal reaches a large market along the mountain front.

The Raton Mesa region, in the southern part of Colorado and the northern part of New Mexico, contains the most valuable and highest-rank coal in this province. The Colorado portion is generally known as the Trinidad field and the New Mexico portion as the Raton field. The rocks lie in a basin-shaped structure, but the edge next to the mountain is sharply upturned and broken through by the old volcanic stock and dikes of the Spanish Peaks. As this basin is filled with younger rocks to a depth of at least 7,000 feet the coal-bearing rocks are deeply covered, and mining has been limited largely to the eastern margin of the region. By the great stresses produced in the folding of the rocks, and possibly by the heat evolved from the stocks and dikes of igneous rocks, the coal has been so much altered as to become of higher rank than any other coal found in this province, except possibly that of the Black Hills. The coal in the southern part of the region makes excellent coke, and the product of the ovens supplies most of the smelters in the Rocky Mountain province.

ROCKY MOUNTAIN PROVINCE.

Until within a few years the coal resources of the Rocky Mountain coal province were largely unknown except a few areas of high-rank coal in Colorado and neighboring States, which were exploited by some of the large steel companies or railroad corporations. Since 1905 the United States Geological Survey has examined most of these fields, either in reconnaissance or in detail, and now the fields of this province are almost as well known as those of the Eastern or Interior provinces.

The coal-bearing formations of the Rocky Mountain province are of Cretaceous and Tertiary (Eocene) age, and doubtless originally extended in almost unbroken sheets throughout the province. Since the deposition of the earliest of these beds the province has been greatly

disturbed by movements in the crust of the earth, which resulted in the formation of great mountain ranges. The areas between the ranges were either depressed or remained stationary while the movement was in progress, so that great intermontane basins or depressions lie in the mountainous region. Most of these basins are floored with coal-bearing rocks of either Cretaceous or Tertiary age or are underlain by such rocks at a greater or less depth. In many basins the coal is not so deep but that it may in the future be reached by deep shafts; but in a few it lies so deep that it probably can never be mined.

The Rocky Mountain province contains a greater variety of coal than any other province in the United States. The coal ranges from lignite to anthracite and includes all the ranks described in this paper, though the prevailing ranks are subbituminous and low-grade bituminous. The coal is mined rather extensively, the greatest centers of development being Red Lodge, Mont.; Rock Springs and Kemmerer, Wyo.; Crested Butte and Durango, Colo.; Castlegate and Sunnyside, Utah; and Gallup, N. Mex.

In Montana the coal fields of the Rocky Mountain province are neither large in area nor of great commercial importance. Persistent efforts have been made to develop the fields that contain the best coal, especially in the vicinity of Livingston, at Trail Creek, Chestnut, and Electric; but for various reasons mining has not been successful, and only one or two mines are now in operation in the Trail Creek field. The coal in these fields is bituminous and has been coked near Livingston and Electric, but the beds are thin and greatly disturbed, and the coal is too impure to compete with other coals in the market.

Many of the areas shown on Plate I are small basins in old lake beds in the mountain valleys, which contain in places thin beds of lignite. These are probably of Miocene (later Tertiary) age.

The most important area in this part of the State is the Red Lodge field, which, so far as Montana is concerned, might be considered in the Northern Great Plains province, because it lies east of the Front Range of the Rocky Mountains, but it is also the northern continuation of the Bighorn Basin region of Wyoming, which lies west of the Bighorn Mountains, a range that is generally con-

sidered the easternmost range of the Rockies, and for that reason the Red Lodge field is here treated as a part of the Rocky Mountain coal province. The coal of the Bighorn Basin is mostly subbituminous, but that in the lower coal-bearing formation, at the north end of the basin, in the vicinity of Bridger, Mont., is bituminous. The subbituminous coal, however, is of excellent quality, especially that mined at Red Lodge and Bear Creek, at the north end of the basin, and at Gebo, near the south end, and compares favorably with the best subbituminous coal of the Rocky Mountain province.

The coal-bearing rocks outcrop in a narrow belt about the great basin and near the foothills of the surrounding mountains. They dip toward the center of the basin, where, as is indicated on the map, they are deeply covered with other rocks that were deposited later. It is estimated that the coal beds near the center of the basin may lie as much as 10,000 feet below the surface. The irregularity in the thickness of the coal beds and the fact that few railroads have been built within the basin have led to the development of only two mining centers, one at Red Lodge, Mont., in the north end of the basin, and the other at Gebo, Wyo., in the south end of the basin.

The Wind River Basin is of much the same character as the Bighorn Basin, except that the late Tertiary formations more nearly conceal the coal-bearing rocks. For this reason less is known regarding the coal beds, which have been mined in only a small way. The coal is subbituminous and compares favorably with the coal of the same rank in adjacent fields. A little coal has been mined in the vicinity of Hudson. The coal in the middle of the basin lies under thick cover and is probably too deep to be profitably mined.

The Green River region is a great irregular basin in southwestern Wyoming, in which the Rock Springs dome rises like an island in the sea. This region contains, besides the Green River Basin proper, a basin lying between Rock Springs and Rawlins, which extends southward and terminates in a point near Steamboat Springs, Colo. The rocks of this basin include four coal-bearing formations, which are generally well exposed in the upturned rim and in the Rock Springs dome, near the center of the basin. Several kinds of coal occur in

the basin, ranging in rank from subbituminous to anthracite. The Tertiary rocks contain subbituminous coal, the Cretaceous rocks subbituminous and bituminous coals, and where these have come in contact with igneous sills, as they have northwest of Steamboat Springs, Colo., anthracite has been formed. The coal at Rock Springs, Wyo., may be regarded as the best type of bituminous coal in this region, and coal of about the same quality occurs along Little Snake River, in Wyoming, and also in the valley of Yampa River, between Hayden and Steamboat Springs, Colo. In the Green River Basin the coal beds are so deeply buried by later formations that it is doubtful whether they can ever be mined.

This enormous basin, which extends from Rawlins on the east to and beyond Grainger on the west, and from the Wind River Mountains on the north to Yampa River on the south, is one of the largest and most important coal regions in the Rocky Mountain province. It embraces an area of about 17,000 square miles and contains four coal-bearing formations, each of which carries from four to twenty coal beds, ranging in thickness from 2 feet to 20 or 25 feet. It is true that the coal in many parts of this region lies so deep that it may never be worked, but after excluding all such areas it is estimated that at least 6,000 square miles is underlain by coal beds that can be mined when the demand for fuel is sufficient to warrant the expenditure necessary for sinking deep shafts. The quantity of coal in the ground in this region is enormous, probably exceeding that in any other region of similar area in this country. There are only two centers of mining in the Green River region. The most important is Rock Springs, Wyo., on the Union Pacific Railroad, where mining has been carried on since that road was completed in 1869. The other mining center has recently developed in the vicinity of Steamboat Springs, Colo., on the Denver & Salt Lake Railroad.

West of the Green River Basin is the Hams Fork coal region, which consists of a number of folds of coal-bearing rocks. These extend nearly northward from the southwest corner of Wyoming for a distance of 200 miles. The coal is subbituminous and high-rank bituminous. The coal beds vary considerably in

thickness, the largest one of subbituminous rank measuring at one place 84 feet of clear coal. This is the thickest coal bed that has been mined or prospected at the surface in the United States. Somewhat thicker beds have been reported in drill logs in other regions, but the uncertainty of determining the thickness and character of beds penetrated by a churn drill renders such a report of doubtful value. The greatest center of mining is at Kemmerer, Wyo., and this coal is regarded as the best that is produced in the State.

East of the Green River Basin is the Hanna field or basin. This basin lies just back of Laramie Mountain, or the Front Range, and is named for Hanna, Wyo., the principal town and the center of the mining industry. The coals are of low rank, being generally subbituminous but possibly including some bituminous coal that is not yet developed. The character of the coal probably explains the meagerness of the mining operations in this field, as the coal can not hold its own, except for local uses, in competition with the better fuel of Rock Springs, on the west, or some of the Colorado coals, on the south.

South of the Uinta Mountains lies a great, irregular basin-shaped coal region, which is called the Uinta region. It extends eastward and southward from the Wasatch Plateau and terminates in a spoon-shaped point near Crested Butte, Colo. The coal-bearing rocks form the rim of this great troughlike depression. From the rim they dip toward the middle and are there deeply buried by later formations. The coal varies considerably in quality, being best at the two extremities of the region. The coals in the vicinity of Crested Butte have been greatly altered, partly by the mountain-building forces and partly by the volcanic material that has been poured out in this area, and as a consequence some of the coal is high-grade anthracite and some belongs to lower ranks. On the rim, especially to the north, the coal changes within a short distance to subbituminous, and this rank characterizes the coal generally along the north rim. The coal on the south rim is generally bituminous, and west of Green River it improves rapidly in quality and increases in quantity to Castle-gate, Utah, where there are many beds of

high-grade bituminous coal, as shown on the map (Pl. I).

The coal beds of the Uinta Basin are not so numerous nor so extensive as those of the Green River Basin, to the north, but even this basin contains an enormous quantity of coal. The area of the basin is about 16,500 square miles, a little less than the area of the Green River Basin, and the part in which the coals are accessible for mining is about 5,750 square miles. The coal beds are most numerous at the two extremities of the region, and naturally those parts contain the greatest quantity of coal. At Newcastle, on Grand River, 109 feet of coal in workable beds has been measured, and the beds at the western extremity are probably just as thick. The thickest bed reported is 40 feet, but beds that measure from 6 to 15 feet are fairly common. The center of mining in the western part of the basin is Castlegate, Utah, where the coal is of excellent quality, and some of it is being coked for use in smelters. The centers of mining in the eastern part of the basin are Crested Butte, where both bituminous coal and anthracite are mined extensively, and Newcastle, on Grand River, a few miles below Glenwood Springs. The coal at Newcastle is generally subbituminous, but a short distance to the south it changes to bituminous and some of it is coked.

The coal-bearing rocks at the west end of the Uinta Basin turn to the south in the Wasatch Plateau, and for convenience of description this area is treated as a separate field. The same coal beds that occur in the vicinity of Castlegate, in the Book Cliffs, are found in the cliffs that form the eastern front of the Wasatch Plateau, and the coal is of about the same rank and thickness. The coal beds in the high cliffs that form the east front of the Wasatch Plateau are nearly horizontal and are well exposed in every canyon that cuts this rim. The plateau has a width of about 25 miles, but the coal beds are not exposed along its western margin, because the rocks on that side dip to the west and pass below later formations.

Most of the coal of this field occurs in the Mesaverde formation, but some is found near the base of the Mancos shale. Coal is not generally found in this shale in the Rocky Mountain province, but toward the southwest this

lower coal-bearing formation becomes more and more important, and in the next fields to the south it is the principal source of supply.

The Colob and Kaiparowits plateau fields lie at the south end of the Wasatch Plateau, near the south line of Utah. The coals of the Colob Plateau have been examined in considerable detail, but those of the Kaiparowits Plateau are known only from casual inspection and from reports of persons who have traveled through that remote region. The coal of the Colob Plateau occurs near the base of the Mancos shale and is of bituminous rank. It lies high on the plateau and is therefore accessible with considerable difficulty. Its disadvantageous position has not, however, prevented its development, but it has been mined only to supply local needs. A small outlier of the field in Iron County, west of Cedar City, contains anthracite, but the coal is impure and probably can not compete with the lower-rank but cleaner coals of Colob Plateau.

The coal in the lower part of the Mancos shale is reported to occur in fairly thick beds in the vicinity of Paria, but no examination has been made to determine their quality or extent. In the Kaiparowits Plateau, northeast of Paria, beds of coal 12 or 15 feet thick have been opened in the face of the cliff and coal has been mined for local use. This coal is in the Mesaverde formation, which probably extends unbroken from the Wasatch Plateau on the north, but in the intervening area it is so covered with lava that the actual connection has never been traced. The quality of this coal has not been determined, but it is probably bituminous and of about the same rank as that in the plateau farther north.

The San Juan River region lies south of the San Juan Mountains, partly in Colorado and partly in New Mexico. It is a great basin-shaped depression with a prolongation running southward through the town of Gallup, on the Santa Fe Railway. Two coal-bearing formations are involved in the folding that produced the basin—the Mesaverde formation at the base and a part of the so-called "Laramie" which has recently been named the Fruitland formation¹ at the top. Both formations are of Upper Cretaceous age; the lower one under-

¹ Bauer, C. M., and Reeside, J. B., Jr., Coal in the middle and eastern parts of San Juan County, N. Mex.: U. S. Geol. Survey Bull. 716, pp. 155-237, 1921.

lies the entire basin, but the upper is restricted to the part of the basin that lies north and east of Chaco River. The depth of the coal-bearing rocks in the center of the basin has not been determined but is probably several thousand feet. The rocks on the rim of the basin dip toward the center; in the northern part the dip is rather steep, but in the southern part it is so gentle that it can scarcely be detected by the unaided eye.

The coal in the lower formation is generally of better quality than that in the upper formation, but each has felt the effects of the movements that resulted in the upheaval of the San Juan Mountains. The coal is normally subbituminous, but around the north rim the lower coal has been changed by pressure into bituminous coal that in some places is good enough to coke. The upper coal is less altered, but toward the east it also is changed to bituminous coal. South of San Juan River all the coal in both formations is subbituminous except possibly some on the east rim, which has been affected by the uplift of the Nacimiento Mountains. The coal beds of the Mesaverde formation range from 3 to 6 feet or more in thickness wherever they have been mined or prospected, and they are exposed at the surface throughout a wide expanse of country, extending from the rim of the basin north of the Santa Fe Railway on the south to Chaco River on the north and across the entire width of the basin in the other direction. The coal beds of the Fruitland formation, although they contain coal of lower rank, are thicker, especially in the northern part of the basin, where they have a known thickness of 40 feet. Such a bed is exposed in the banks of Animas River below Durango, Colo., but the bed is badly broken by partings which would make mining expensive and detract greatly from the value of the coal.

The north and south sides of the basin have railroad connection, and in these parts the coal is mined, but the mines on the north side are handicapped by having to ship their coal over two mountain ranges and those on the south side have to handle a low-rank fuel, which can not easily compete with coal of a higher rank in near-by fields. Despite these drawbacks and the keen competition of fuel oil, the mines have managed to keep in operation, and the coal meets with a ready though local sale.

The Black Mesa field of Arizona is entirely undeveloped and is therefore largely unknown, except locally. It lies in the Hopi and Navajo Indian reservations and is about 75 miles distant from the nearest railroad point. The coal beds are in the Mancos shale and the Mesaverde formation, both of Upper Cretaceous age. The rocks lie in the shape of a broad, flat basin, forming a plateau upon which some of the Hopi Indian villages are built. The coal is subbituminous but of excellent quality and is used locally for the Indian schools.

Besides the main fields and regions noted above, there are a number of isolated outliers of coal-bearing rocks, mainly in New Mexico and Arizona, that are too small and unimportant to be considered here individually. Some of them, like Los Cerrillos, Carthage, and Capitan, in New Mexico, have been developed to some extent, because they contain coal of a better quality than could be found in many of the larger regions. Thus Los Cerrillos has for many years produced a fine grade of anthracite from a coal bed that has been locally changed by the heat of a sill of igneous rock, and the Carthage field has yielded coking coal. Most of these small fields are comparatively insignificant and will not be described further.

PACIFIC COAST PROVINCE.

The coal in the Pacific Coast province is limited largely to the State of Washington. Both California and Oregon have small fields within their borders, but the coal is generally of low rank or poor quality, and but little mining has been attempted. Washington, on the other hand, is fairly well supplied with coal in the western part, where it is most needed for the various industries that have been developed about Puget Sound. The coal-bearing rocks of Washington have been so greatly folded and contorted and then so deeply covered with glacial drift that it is possible to separate only a few of them into well-marked fields, and according to the local practice they are therefore generally subdivided arbitrarily according to the county in which they occur. The local practice will be followed here.

The coal fields of King County lie on the west side of the Cascade Mountains, extending from tidewater in the vicinity of Renton, 12 miles southeast of Seattle, to the foot of the

mountains on the east. The thick cover of glacial drift and the almost impenetrable forest make coal prospecting laborious and difficult except near the principal streams, where these obstructions have been to some extent removed. The coal-bearing rocks are of Eocene (Tertiary) age and correspond in time of deposition with the lignite of the Dakotas, Montana, and Texas. In Washington, however, mountain-building forces have been so active in late Tertiary time that many of the coals have been changed from lignite to subbituminous, bituminous, and even to anthracite. In general, the coals nearest the Cascade Mountains are the most altered. The mountain-building forces not only changed the character of the coal but also folded and broke the rocks in a most intricate manner, so that in places mining is difficult and expensive. The coal beds generally dip at considerable angles and are locally broken and displaced, so that it is difficult to follow a coal bed in mining. The old swamps in which the coal was deposited were apparently subject to many floods, which washed mud and sand in from the surrounding higher lands. These materials settled to the bottom of the swamp, forming a shale or sandstone layer or parting in the coal bed, which to-day detracts greatly from its value, for the shale or sandstone must be removed before the coal can be marketed, and its removal is generally difficult and expensive. If the coal is put on the market after it is simply screened, it will contain a large percentage of ash, which makes it difficult to sell. The lump coal reaches the market in fairly good condition, but in many places the fine coal is too impure for marketing and must be washed before it can find purchasers. All coals contain more or less foreign material, in the form of partings or binders, but the coal of Washington includes more of such partings than the coal of many other parts of the United States.

The coals of King County are of subbituminous and bituminous rank in about equal proportions. The best coal in the county, to judge from the heating value of the pure coal, occurs along the mountain front from Snoqualmie on the north to Cumberland, a little south of Palmer Junction, on the south, embracing a belt of country not more than 3 or 4 miles in width. West of this belt lies a similar belt of

good coal, which, however, has a lower heating value than that of the belt just mentioned; and then west of all is a belt of indefinite width in which the coal is subbituminous.

Many large mines are developed in this county, especially in the higher-rank coals near the mountain front, but some of the subbituminous coals, owing largely to their position on or near tidewater, are extensively mined, the coal finding a ready market as a domestic fuel.

The coals of Pierce County are the best in the State, but the known productive territory is very much smaller than that in King County. All the coals of this county so far mined or prospected are of bituminous or higher rank. The coal districts may roughly be divided into two groups—(1) the Wilkeson-Carbon Hill and adjacent districts, containing mainly high-grade bituminous coal but also some semibituminous coal, much of which will coke; and (2) the Melmont, Fairfax, and Montezuma districts, containing coal having a fuel ratio ranging from 2½ to more than 6. Thus most of these coals come within the rank of high-class bituminous and semibituminous coal. The coal at Wilkeson is the only coal in the State that has been extensively coked. All these coals bear an excellent reputation in the market.

The coal-bearing rocks in the fields of Pierce County are even more strongly folded and faulted than those of King County, on the north. Many of the coal beds are cut by dikes that ray out from the great volcanic center of Mount Rainier. The coal beds are exposed mainly in the deep canyons cut by Carbon River and its tributaries and consequently have been mined mainly along that stream. The mines are only a short distance from tidewater at Tacoma, with which they are connected by a branch line of the Northern Pacific Railway that was long ago built into this field for the purpose of obtaining fuel for use in locomotives.

All the developed coal of Kittitas County is in the Roslyn field, which is a regular, shallow basin in the vicinity of Cle Elum, in the valley of Yakima River, on the east side of the Cascade Mountains. The basin is not complicated by minor folds and faults, as are those on the west side of the mountains, and hence mining conditions are almost ideal. The coal is a hard, blocky coal of fairly uniform quality,

well adapted to shipping and handling. It has been extensively used by the Northern Pacific Railway for locomotive fuel. It is mined by slopes and drifts on the outcrop and by shafts in the middle of the basin.

The coal fields of Thurston and Lewis counties are neither so well known nor so well developed as those of the counties just mentioned, largely because the coal of better rank near the mountains is in many places deeply covered with lava flows, glacial drift, and almost impenetrable forests. The coal in this region near the mountains is of high rank, in many places anthracite, but the complicated folds into which the strata have been bent and the abundance of partings in the coal beds make it impossible to mine the coal at a profit. The developed fields in these counties lie farther from the mountains, along the railroad lines leading from Tacoma, Wash., to Portland, Oreg. The coal beds in this part of the region are comparatively undisturbed and lie in an almost horizontal position. The coal, not having been subjected to the pressures that were exerted farther east when the mountains were uplifted, is of low rank. Those who have examined it most carefully are undecided whether to class it as lignite or subbituminous coal. It lies close to the dividing line between those two ranks and has generally been classed as subbituminous. It contains a large percentage of moisture, slacks badly when exposed to the atmosphere, and is little if any better as a fuel than Texas lignite. The extent of this low-rank coal has not been accurately determined, but it probably extends southward to Columbia River.

The coal fields of Whatcom and Skagit counties are perhaps less extensive than those of the counties so far considered. The coals in these counties range in rank from subbituminous coal at Bellingham to anthracite at Glacier. The anthracite lies in the valley of Glacier Creek northwest of Mount Baker and compares favorably in quality with some of the anthracite of the East. It has not yet been produced on a commercial scale, but mines are being opened, and it may soon be put on the market. High-rank coal has been mined and coked at Blue Canyon, in Whatcom County, and at Cokedale, in Skagit County, but these plants are now abandoned. The oldest mining operation in this region was at

Bellingham, where a bed of subbituminous coal 14 feet thick was mined extensively about 30 years ago. On account of the low rank of the coal, the mine was soon abandoned, and now very little coal is mined in either Whatcom County or Skagit County. The rank of the coal, like that of all other coals in this country, decreases away from the mountains.

There are a number of small fields or isolated occurrences of coal in other counties, but they are of little importance and will not be described here.

Only a little coal occurs in Oregon, and that is of poor quality. Mining has been done in a commercial way only in the Coos Bay field, on the coast, in the southern part of the State. The coal in this field is subbituminous and has done little more than to supply the small local demand. Although there is considerable coal in this field, it is difficult to mine, and much of it lies below the waters of the bay. The field is not promising and probably never will be a large producer.

The best coal so far discovered in Oregon is in the Eden Ridge field, in the southern part of Coos County. The rocks are somewhat more disturbed here than in the vicinity of Coos Bay and the coal is of higher rank. It is bituminous, and some of it will coke, but the beds are full of shale partings, which make the coal very impure. The field has no railroad connection at the present time, and consequently no mining has been undertaken.

Coal has been noted near Medford, in Jackson County; in the Nehalem Valley, in Columbia County, and in other parts of the State, but at none of these places is it of sufficient thickness or purity to be of value.

California, although rich in many other mineral resources, is singularly deficient in coal. At present the lack of coal is not felt, for the State has abundant supplies of fuel oil, but these supplies will sooner or later be consumed, and when the oil is exhausted the problem of obtaining coal will become vital. The only coal field of any prospective importance is that which lies in the Coast Ranges, in San Benito and Monterey counties, and which is known from the places at which the coal has been prospected. The most ambitious attempt to develop this field was made at Stone Canyon, Monterey County, where a bed of coal ranging from 10 to 14 feet in thickness

was opened. The attempt was not successful, however, and the mine was abandoned. This coal is of the bituminous rank, and is the only coal of this rank in the State. It is very rich in bituminous matter and is in composition a cannel coal, though it has none of the physical properties of such a coal.

PRODUCTION AND ORIGINAL TONNAGE OF COAL IN THE UNITED STATES.

Although the general description of a coal field is very important to one considering the development of mines, or to one contemplating an investment in mines or in mineral lands, there is another phase of the subject that is of equal if not greater importance to the political economist, and that is the quantity of coal still remaining in the ground, to which future generations may look for their supply of power and heat. As stated in the first part of this introduction, the United States Geological Survey has endeavored to determine this quantity by making estimates of the original tonnage of the various fields, deducting the coal already mined and wasted in mining, and calling the remainder the present and future supply. Such estimates, when first made, were very unsatisfactory, for the data available, even in some of the coal-mining States of the East, were far from adequate for a quantitative statement of this kind, and some of the western coal fields were so little known that only a guess could be made as to their area or tonnage. Nevertheless an estimate was made and published in 1908, in order to meet some of the demands of the time in the discussion of the available resources of the Nation.

The constantly increasing knowledge of the coal fields of the West acquired by the Geological Survey in the course of its regular work of classifying the withdrawn lands and the interest and activity of several State geologists showed clearly that the first estimate of the United States Geological Survey was inadequate and should be revised at an early date. This revision was undertaken in 1912, and the results of the new estimate were published in 1913 as a part of the report on the coal fields of the world made by the Twelfth International Geological Congress. Though this estimate was founded on much more reliable information, and though this information was much more widely applicable to the coal fields

of the country, the writer is still conscious of the weak places that of necessity must exist in such an estimate, and he will relish the opportunity to revise the figures at some future time when new information is available, such as will give the estimate an accuracy that it has not heretofore been possible to attain.

In undertaking to make an estimate of the original tonnage of coal in the ground, certain assumptions must be made as a foundation, and the results attained will depend largely upon these assumptions. The three principal assumptions are (1) minimum thickness of bed of the different ranks and grades of coal that can be mined, (2) maximum depth to which mining may be carried in the different ranks of coal, and (3) maximum percentage of ash that may be permitted in the various ranks of coal. As probably no two persons who have attempted to make estimates have made the same basic assumptions, so no two estimates agree as to the tonnage involved. This point is very important and is one that is usually lost sight of by the casual reader, who doubtless wonders why it is that experts disagree so widely in their estimates; whereas if he had analyzed the results a little more closely he might have found that the results were practically in accord.

Most engineers employed by private corporations base their estimates on the present practice of mining and preparing coal for the market, for the mining company must adopt this practice, and manifestly the company will not consider coal minable if it lies at a depth of 4,000 feet while plenty of coal of the same kind is available at a depth not exceeding 1,000 feet. Similarly, it will not consider minable a coal bed 20 inches thick while other beds of coal of the same kind of much greater thickness are still available. Also, to the operator of the present time, 15 per cent of ash in a coal may prevent its sale, and therefore its mining may be impracticable; whereas, if plenty of water were available and a washery were installed, 15 per cent of ash might be no bar to the mining and marketing of the coal. Most of the estimates so far made have been based on present mining conditions and practices, and hence they do not necessarily represent the tonnage that may be regarded as available 10 or even 5 years hence.

In attempting to make estimates of the original coal content of the fields of the United States, the Geological Survey decided that it would be a waste of time and money to attempt to make estimates based on present mining practice, for such estimates would be misleading in that they would not represent the total quantity of coal that undoubtedly would be made available in the future. With this point in mind, it was decided to attempt to estimate the total quantity of coal that ever would be mined in the United States, looking ahead 40, 50, or perhaps even 100 years. Of course, it is not contended that anyone living to-day can say positively what will be done 100 years hence, but an attempt was made to prepare such a forecast. In doing so the present mining practice throughout the world was considered, and the assumptions regarding maximum depth, minimum thickness, and maximum impurity were based upon present practice, but generally the limits now observed were exceeded because it is almost certain that the future will go far beyond the present operations, for in some places to-day the methods are far better than those that generally prevailed 20 or even 10 years ago.

As the deepest coal mines in the world (in Belgium) reach a depth of about 4,000 feet, and as shafts for copper and other metals have been sunk to depths below 5,000 feet, it was thought that future coal mining might be carried to a depth of 6,000 feet; but in order to meet various requirements two limits were set, one at a depth of 3,000 feet, for easily minable coal, and the other at a depth of 6,000 feet, a depth that represents what is now considered the ultimate limit of coal mining. Similarly the minimum thickness of coal bed mined in the United States is about 15 inches; therefore 14 inches was taken as the minimum of high-rank coals for estimating the original tonnage in the several fields. The minimum thickness varies according to the rank of the coal, being approximately 2 feet in subbituminous coal and 3 feet in lignite. The maximum percentage of ash permissible in a coal is more difficult to determine, on account of the variability of the factors involved in the operation of cleaning such coal for the market. Thirty per cent has been regarded as the limit, but it is questionable whether it would not better be placed at 25 per cent.

With the basic factors of the process determined, the actual application of the principle of estimation is an engineering problem, which depends upon the data collected by the geologist and his mapping of the coal fields. For many of the fields these data are fairly sufficient and reasonably accurate estimates have been made, but for other fields the data are confessedly inadequate and the estimates are correspondingly unsatisfactory. The detailed estimates for the fields and States will be given in the chapters devoted to the States, but the accompanying general table shows the estimates by regions and provinces, as such treatment involves in many of the regions parts of several States and hence can be presented only in this introductory statement.

The table shows clearly certain features that are of the greatest interest regarding the distribution and amount of coal in the fields of the United States. It shows first that the great bulk of the coal in this country is low-rank bituminous, lignite, and subbituminous, named in the order of their abundance, and that the high-rank coals are relatively scarce. This is an important point in conservation, as it means that our best coal will be the first to be exhausted and that such exhaustion may occur in the not very distant future. It is also noticeable that the best steaming coal, the semibituminous, is limited practically to the two eastern provinces, and that the exhaustion of this coal will be a greater calamity to the country than the loss of all the anthracite, for coal of this kind has a greater efficiency and is adapted to more diverse uses than anthracite. Most people think of the eastern part of the United States as the greatest repository of coal in the country, and therefore they may be surprised to find that there are two areas in the West that contain a greater quantity. The greatest quantity of coal originally contained in any single area of continuous coal-bearing rocks is 1,202,032,000,000 tons, in the Fort Union region of Montana, Wyoming, and the Dakotas; the second is 665,649,000,000 tons, in the Green River region of Wyoming; and the third is 550,898,000,000 tons, in the Appalachian region of the East.

When the output of the mines is compared with the original quantity available it is seen that the great bulk of our coal is not necessarily coming from the areas that contain the

Original and present quantity of coal in the United States and total production of the mines from the beginning of coal mining to the end of 1918, in short tons.

Province, region, or field.	Estimate of the original tonnage.							Total production to end of 1918. ^a	Estimated coal reserve Jan. 1, 1919. ^b
	Anthracite and semianthracite.	Semibituminous coal.	Bituminous coal.	Subbituminous coal.	Lignite.	Total coal of all ranks.	Coal below surface from 3,000 to 6,000 feet.		
Eastern province:									
Anthracite region (Pennsylvania).....	21, 000, 000, 000					21, 000, 000, 000		2, 912, 528, 966	17, 505, 000, 000
Atlantic coast region.....	50, 000, 000	450, 000, 000	600, 000, 000			1, 100, 000, 000		7, 003, 000	1, 090, 000, 000
Appalachian region.....		48, 487, 000, 000	502, 411, 000, 000			550, 898, 000, 000		6, 645, 120, 920	542, 259, 000, 000
	21, 050, 000, 000	48, 937, 000, 000	503, 011, 000, 000			572, 998, 000, 000		9, 564, 652, 886	560, 854, 000, 000
Interior province:									
Northern and Eastern regions.....			321, 990, 800, 000			321, 990, 800, 000		1, 883, 860, 424	319, 541, 000, 000
Western and Southwestern regions.....	400, 000, 000	1, 226, 000, 000	206, 282, 200, 000			207, 908, 200, 000		687, 229, 360	207, 015, 000, 000
	400, 000, 000	1, 226, 000, 000	528, 273, 000, 000			529, 899, 000, 000		2, 571, 089, 784	526, 556, 000, 000
Gulf province.....					23, 090, 000, 000	23, 090, 000, 000		14, 668, 977	23, 068, 000, 000
Northern Great Plains province:									
Fort Union region, including Black Hills region.....			133, 000, 000	187, 475, 000, 000	1, 014, 424, 000, 000	1, 202, 032, 000, 000		40, 503, 631	1, 201, 970, 000, 000
Small fields in Montana.....			2, 000, 000, 000	7, 073, 000, 000		9, 073, 000, 000		33, 872, 835	9, 022, 000, 000
Denver region and Canon City field.....			1, 028, 000, 000	40, 000, 000, 000		41, 028, 000, 000		60, 316, 785	40, 943, 000, 000
Raton Mesa region.....			42, 392, 000, 000			42, 392, 000, 000		169, 996, 333	42, 171, 000, 000
			45, 553, 000, 000	234, 548, 000, 000	1, 014, 424, 000, 000	1, 294, 525, 000, 000		304, 689, 584	1, 294, 106, 000, 000
Rocky Mountain province:									
Small fields in Montana.....			47, 000, 000	3, 496, 000, 000		3, 543, 000, 000		5, 549, 800	3, 545, 000, 000
Bighorn Basin and Wind River Basin regions, including Red Lodge field.....			608, 000, 000	4, 697, 000, 000		5, 305, 000, 000	12, 010, 000, 000	24, 513, 446	5, 271, 000, 000
Green River and Hams Fork regions and Hanna field.....	22, 000, 000		174, 127, 000, 000	491, 500, 000, 000		665, 649, 000, 000	396, 720, 000, 000	128, 075, 564	665, 470, 000, 000
Uinta region and Wasatch Plateau.....	480, 000, 000		162, 767, 000, 000	5, 000, 000, 000		168, 247, 000, 000	243, 540, 000, 000	77, 161, 497	168, 146, 000, 000
North and South parks.....			20, 000, 000	2, 850, 000, 000		2, 870, 000, 000		904, 666	2, 868, 000, 000
Southwestern Utah region.....			4, 000, 000, 000			4, 000, 000, 000		6, 000	3, 999, 990, 000
Coalville field, Utah.....				156, 000, 000		156, 000, 000		2, 655, 728	152, 000, 000
San Juan Basin region.....			9, 372, 000, 000	185, 655, 000, 000		195, 027, 000, 000	14, 330, 000, 000	21, 163, 448	194, 997, 000, 000
Small fields in New Mexico and Arizona.....			1, 005, 000, 000	20, 891, 000, 000		21, 896, 000, 000		4, 967, 101	21, 888, 000, 000
Idaho and Nevada fields.....			600, 000, 000	100, 000, 000		700, 000, 000			
	502, 000, 000		352, 546, 000, 000	714, 345, 000, 000		1, 067, 393, 000, 000	666, 600, 000, 000	264, 997, 250	1, 066, 336, 990, 000
Pacific coast province:									
Washington fields.....	8, 000, 000		11, 412, 000, 000	52, 442, 000, 000		63, 862, 000, 000		81, 404, 057	63, 740, 000, 000
Oregon and California fields.....			27, 000, 000	1, 016, 000, 000		1, 043, 000, 000		7, 514, 816	1, 030, 000, 000
	8, 000, 000		11, 439, 000, 000	53, 458, 000, 000		64, 905, 000, 000		88, 918, 873	64, 770, 000, 000
	21, 960, 000, 000	50, 163, 000, 000	1, 440, 822, 000, 000	1, 002, 351, 000, 000	1, 037, 514, 000, 000	3, 552, 810, 000, 000	666, 600, 000, 000	12, 809, 017, 354	3, 535, 690, 990, 000

^a Many of the figures given in this column are approximate only, as the records have not been kept by natural fields but by counties and States. The total production is correct, however, agreeing with the production given in Mineral Resources for 1918 Part II.

^b Obtained by adding to the total production to the end of 1918 from 20 to 50 per cent for waste and loss in mining and deducting the sum from the total coal of all ranks.

greatest quantity, but from the areas that contain the best coal. This discrepancy becomes more startling when the production of the individual States is compared with their original coal resources.

Although the relative size of the contents of the coal fields may be a matter of some surprise, the really staggering fact presented in the table is the immense, really inconceivable total quantity of the coal. The 3,535,690,990,000 tons of unmined coal within 3,000 feet of the

unknown factors that any estimate partakes of the nature of a guess. Figure 2 represents graphically the coal production in the United States by decades since 1834, and the increasing length of black shows conclusively that our coal production, or consumption, as it may well be called, is growing with great rapidity. In attempting, therefore, to calculate how long the available coal will last it is manifestly incorrect to base the calculation on the present rate of production or consumption, or on the

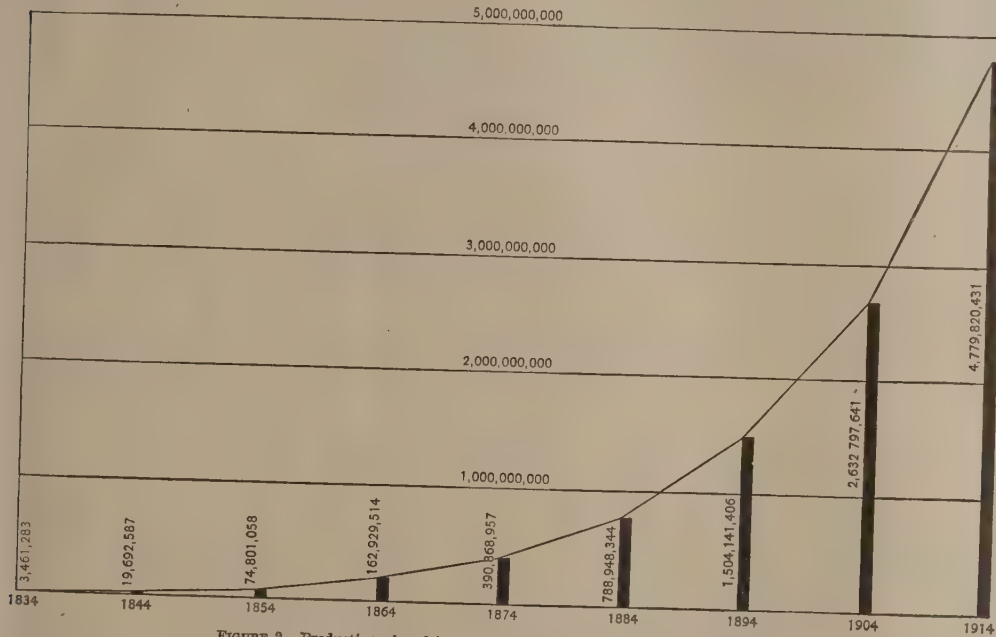


FIGURE 2.—Production of coal in the United States by decades from 1834 to 1914.

surface is enough to cover the entire State of Ohio (area 41,040 square miles) to a depth of about 76 feet. Similarly, if all the coal that has been mined in the United States, plus about 40 per cent for waste, a total of 17,119,010,000 tons, were piled to a height of 76 feet, it would cover a square a little more than 14 miles on either side; in other words, the exhaustion up to the end of 1918 amounted to only about one-half of 1 per cent of the original total supply.

There has been considerable speculation regarding the length of time the coal supplies would last, but here again there are so many

rate for the last decade, as the rate will continue to increase for a long time. If we assume that the rate of consumption will remain the same as it was in 1913, then, after allowance has been made for unpreventable waste in mining and marketing, there will be enough coal to last 4,000 years; but of course such an estimate is absurd, for the rate of 1913 will probably not be held in any single future year.

If the curve shown in figure 2 should be prolonged at its rapidly increasing rate, and if this acceleration should be continued until the coal is completely exhausted, the supply would probably not last 100 years. The true

life of our coal fields probably lies between these two extremes, and the probability is that it will be nearer 100 than 4,000 years.

In 1908 Parker¹ attempted to extend the curve of production to what he conceived might be the possible maximum that would ever be reached in this country. His curve, with slight modification to fit recently acquired data, is shown in figure 3. The past and the estimated future production were grouped by decades, beginning with 1835 and extending to the year 2055, when, according to his calculations, the maximum production of 23,000,000,000 short tons would be reached. As the quantity of coal mined in the decade ending

the actual production in this period, which was 4,918,717,283 tons. Thus it seems that his estimated maximum production is too small or that the maximum will be reached before the year 2055. The estimate is probably too small and the maximum production will therefore probably be greater than 23,000,000,000 tons in a decade.

Although by every reasonable estimate the ultimate exhaustion of the coal reserves of the United States appears to be an event so far in the future that it need concern this generation but slightly, the fact must be remembered that the bulk of the coal being mined to-day is the best in the country and that be-

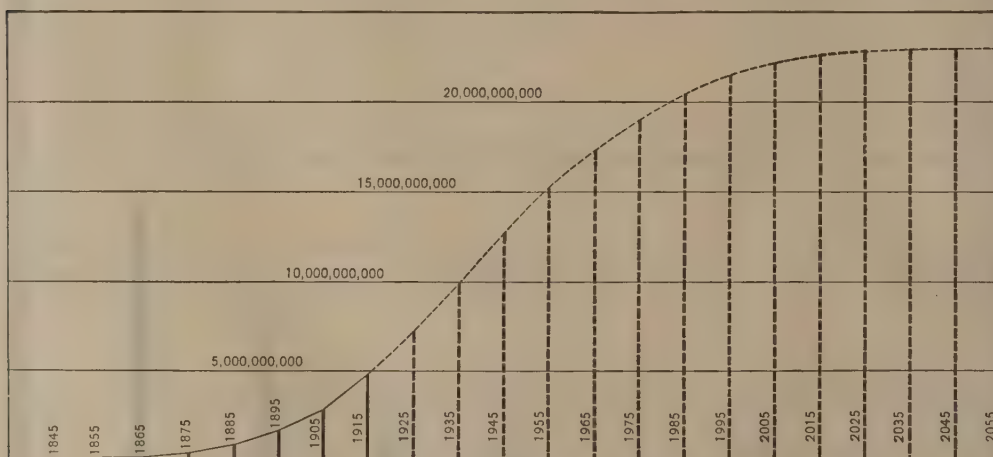


FIGURE 3.—Estimated production of coal in the United States to the year 2055. (After E. W. Parker.)

with 1918 was 5,528,066,336 short tons, the maximum, according to Parker's figures, would be roughly four times the present production. After the maximum had been reached the production, owing to increased cost of mine haulage, of hoisting from deeper shafts, and of working thinner beds, would gradually decrease, but the decrease would probably be much less rapid than the increase up to the maximum. According to the present estimates there is enough coal in the ground to permit production at this assumed maximum rate for more than 10 decades or 100 years.

The figures showing the production since 1908 prove that Parker's curve is too flat, for his estimate of the production in the period ending in 1915 (4,528,000,000 tons) falls below

fore long, perhaps within 50 years, much of the high-rank coal will be exhausted.

According to the latest estimates² the coal reserves of the world, by continents, are as follows:

	Short tons.
Americas.....	5,627,823,500,000
Asia.....	1,410,487,600,000
Europe.....	864,412,600,000
*Oceania.....	187,842,900,000
Africa.....	63,755,900,000
	8,154,322,500,000

Of the amount contained in the Americas, the United States claims 4,202,000,000,000 tons, or 51 per cent of the total coal of the world. Listed according to coal reserves, the principal

¹ Parker, E. W., Past and future coal production in the United States: *Mines and Minerals*, vol. 28, pp. 462-465.

² The coal resources of the world, an inquiry made upon the initiative of the executive committee of the Twelfth International Geological Congress, Canada, 1913, Morang & Co. (Ltd.), Toronto, Canada.

coal-producing countries of the world stand as follows:

	Short tons.
United States, including Alaska.....	4, 231, 352, 000, 000
Canada.....	1, 360, 535, 000, 000
China.....	1, 097, 436, 000, 000
Germany.....	466, 665, 000, 000
Great Britain and Ireland.....	208, 922, 000, 000
Siberia.....	191, 667, 000, 000
Australia.....	182, 510, 000, 000
India.....	87, 083, 000, 000
Russia in Europe.....	66, 255, 000, 000
Union of South Africa.....	61, 949, 000, 000
Austria.....	59, 387, 000, 000
Colombia.....	29, 762, 000, 000
Indo-China.....	22, 048, 000, 000
France.....	19, 382, 000, 000
Other countries.....	69, 369, 500, 000
	8, 154, 322, 500, 000

ANALYSES OF REPRESENTATIVE COALS.

In order that the reader may obtain an idea of the comparative value and rank of the coals of the United States, analyses of representative samples are tabulated on the following pages. The figures given are those obtained by the analysis of individual samples of coal, but each sample has been so selected that it represents the average composition of the coal of a certain

district or field or the composition of a certain rank of coal.

Most of the analyses given in the table were made by the Bureau of Mines or the United States Geological Survey and so are strictly comparable, but for a few coals, as indicated, such analyses are not available and the figures given are taken from a State report.

The analysis given is that of the sample of coal as it was received at the laboratory. This sample was sealed in an air-tight receptacle immediately after it was cut in the mine, and it reached the laboratory in the same condition as it was in when it was cut in the mine. For this reason the analyses show a larger percentage of moisture than most analyses made for private persons, because the samples so analyzed have not been sealed and the coal has therefore lost some of the moisture it contained when it was in the mine. The Government analyses represent the coal as it leaves the mine and approximately as it reaches the consumer. If the coal is shipped in dry and hot weather some of its moisture may be evaporated; on the other hand, if rain falls on the coal in transit, its original moisture content may be appreciably increased.

The analyses are as follows:

Analyses of representative coals of the United States.

[Unless otherwise specified all analyses were made by the United States Geological Survey or the Bureau of Mines.]

Location and rank of coal.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Heat value (British thermal units).
ALABAMA.						
Lookout Mountain, semibituminous.....	3.8	19.0	64.4	12.8	1.5	12,980
Blount County, bituminous.....	3.4	27.7	55.9	13.0	1.2	12,740
Birmingham district, bituminous, coking.....	2.4	25.9	66.8	4.9	1.5	14,490
Do.....	2.3	29.7	58.0	10.0	.8	13,490
Birmingham district, bituminous.....	1.7	31.3	60.8	6.2	1.5	14,290
Carbon Hill district, bituminous.....	4.7	31.8	53.3	10.2	1.3	12,600
Tuscaloosa district, bituminous.....	1.6	25.0	68.5	4.9	.5	14,700
Cahaba field, bituminous.....	3.1	35.0	55.8	6.1	.4	13,560
Do.....	3.2	31.0	59.6	6.2	1.2	14,140
ARIZONA.						
Black Mesa field, subbituminous.....	9.9	32.6	46.9	10.6	1.1	10,800
ARKANSAS.						
Russellville district, semianthracite.....	2.1	9.8	78.8	9.3	1.7	13,700
Spadra district, semianthracite.....	1.7	10.5	79.5	8.3	2.5	13,870
Coal Hill district, semibituminous.....	1.4	14.8	76.9	6.9	1.5	14,330
Paris district, semibituminous.....	2.8	14.7	73.4	9.1	2.8	13,770
Jenny Lind district, semibituminous.....	1.6	17.4	73.1	7.9	1.4	14,160
Huntington district, semibituminous.....	3.5	16.7	72.0	7.8	1.3	14,020
Camden district, lignite.....	39.4	26.5	24.4	9.7	.5	6,360

Analyses of representative coals of the United States—Continued.

Location and rank of coal.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Heat value (British thermal units).
CALIFORNIA.						
Stone Canyon district, bituminous.....	7.0	46.7	40.1	6.2	4.2	12,450
Mount Diablo district, subbituminous.....	15.0	38.4	34.5	12.1	5.6	9,240
Tesla district, subbituminous.....	18.0	39.2	26.4	16.4	3.1	8,110
COLORADO.						
Denver field, subbituminous.....	18.8	30.5	44.5	6.2	.3	9,650
Do.....	25.6	28.0	41.1	5.3	.4	9,180
Colorado Springs field, subbituminous.....	26.2	29.7	37.7	6.4	.3	8,350
Canon City field, bituminous.....	9.1	35.7	48.0	7.2	.9	11,700
Trinidad field, bituminous, coking.....	2.1	31.1	54.0	12.8	.6	13,110
Trinidad field, bituminous, noncoking.....	6.8	35.7	46.7	10.8	.8	11,600
North Park field, subbituminous.....	20.0	32.5	42.5	5.0	.6	9,750
Yampa field, anthracite.....	7.0	3.4	75.6	14.0	.6	11,740
Yampa field, bituminous.....	10.4	37.9	45.5	6.2	.4	11,470
Newcastle field, bituminous.....	7.1	40.8	46.9	5.2	.5	12,620
Newcastle field, bituminous, coking.....	2.9	33.3	56.7	7.1	.5	13,720
Coal Basin field, semibituminous.....	2.4	19.4	70.8	7.4	.5	14,380
Crested Butte field, anthracite.....	3.0	2.9	86.6	7.5	.7	13,500
Crested Butte field, bituminous.....	5.6	37.6	47.6	9.2	.4	12,430
Grand Junction field, bituminous.....	7.6	33.6	52.9	5.9	.7	12,440
Durango field, bituminous, coking.....	2.7	36.1	54.5	6.7	.5	13,910
GEORGIA.						
Manlo district, semibituminous.....	2.9	17.1	72.2	7.8	.7	14,200
IDAHO.						
St. Anthony field, bituminous.....	11.5	37.2	47.0	4.3	.5	12,090
Goose Creek field, lignite.....	34.3	26.6	25.7	13.4	2.5	8,610
ILLINOIS.						
La Salle County, bituminous.....	13.9	37.3	38.5	10.3	3.4	10,990
Peoria County, bituminous.....	15.5	34.7	39.8	10.0	2.9	10,740
Fulton County, bituminous.....	15.7	31.4	43.1	9.8	3.0	10,620
McLean County, bituminous.....	10.2	35.9	40.1	13.8	2.8	11,150
Logan County, bituminous.....	14.8	32.9	39.7	12.6	4.0	10,410
Sangamon County, bituminous.....	14.3	37.2	40.3	8.2	4.4	11,010
Macoupin County, bituminous.....	13.3	37.1	40.7	8.9	4.1	11,160
Montgomery County, bituminous.....	12.7	35.5	40.2	11.6	4.2	10,670
Madison and St. Clair counties, bituminous.....	12.7	36.4	41.4	9.5	3.7	10,990
Marion County, bituminous.....	10.3	37.4	39.8	12.5	3.7	11,080
Franklin County, bituminous.....	9.2	33.8	48.6	8.4	.9	11,930
Williamson County, bituminous.....	8.8	29.9	53.8	7.5	1.1	12,220
Saline County, bituminous.....	6.0	32.4	54.3	7.3	1.7	12,790
Gallatin County, bituminous.....	3.4	35.2	52.5	8.9	2.9	13,190
INDIANA.						
Vermilion County, bituminous.....	10.5	39.5	39.6	10.4	4.0	11,430
Clay County, bituminous, block.....	15.4	32.6	46.1	5.9	2.0	11,680
Sullivan County, bituminous.....	13.6	35.0	44.6	6.8	1.1	11,550
Knox County, bituminous.....	10.6	38.1	43.0	8.3	3.7	11,750
Pike County, bituminous.....	11.3	38.3	43.5	6.9	3.1	11,920
Warrick County, bituminous.....	10.4	39.2	42.0	8.4	3.5	11,820
Vanderburgh County, bituminous.....	9.7	35.6	44.5	10.2	2.9	11,440
IOWA.						
Boone County, bituminous ^a	19.5	33.4	38.3	8.8	5.4	10,520
Polk County, bituminous.....	14.4	37.8	36.8	11.0	5.9	10,640
Jasper County, bituminous ^a	9.3	39.2	39.1	12.4	2.4	11,210
Marion County, bituminous.....	15.7	36.9	35.8	11.6	5.1	10,290
Mahaska County, bituminous ^a	14.6	36.3	40.5	8.6	2.9	11,000

^a Analyses made by the Iowa State University.

Analyses of representative coals of the United States—Continued.

Location and rank of coal.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Heat value (British thermal units).
IOWA—continued.						
Lucas County, bituminous.....	18.7	31.8	41.8	7.7	2.4	10,510
Monroe County, bituminous.....	15.8	36.9	37.9	9.4	4.7	12,900
Wapello County, bituminous.....	11.3	38.7	39.5	10.5	4.7	11,350
Taylor County, bituminous ^a	20.2	30.1	38.3	11.4	4.2	10,120
Appanoose County, bituminous.....	17.1	35.4	40.4	7.1	4.0	10,930
KANSAS.						
Leavenworth County, bituminous.....	12.0	35.2	39.1	13.7	4.4	10,720
Linn County, bituminous.....	11.1	28.8	47.5	12.6	2.4	11,220
Crawford County, bituminous.....	4.9	33.5	52.5	9.1	5.0	12,940
Cherokee County, bituminous.....	5.1	32.6	53.4	8.9	4.3	12,930
EASTERN KENTUCKY.						
Johnson County, bituminous.....	6.4	36.2	54.1	3.3	1.2	13,460
Johnson County, bituminous, cannel.....	2.2	50.6	36.7	10.5	1.0	13,750
Pike County, bituminous.....	2.8	36.2	56.7	4.3	1.4	14,180
Letcher County, bituminous.....	2.5	36.5	57.0	4.0	.6	14,150
Perry County, bituminous.....	3.9	37.2	54.8	4.1	.8	13,730
Laurel County, bituminous.....	4.5	39.9	50.8	4.8	2.3	13,510
Harlan County, bituminous.....	4.4	35.0	56.9	3.7	.7	13,920
Bell County, bituminous.....	2.8	37.8	56.3	3.1	1.0	14,240
Knox County, bituminous.....	4.2	36.4	53.3	6.1	.8	13,410
WESTERN KENTUCKY.						
Daviess County, bituminous.....	11.8	36.8	42.0	9.4	3.3	11,150
Ohio County, bituminous.....	10.0	36.5	44.9	8.6	2.6	11,770
Muhlenberg County, bituminous.....	8.8	36.2	46.4	8.6	3.6	11,900
Hopkins County, bituminous.....	8.5	38.0	46.4	7.1	3.5	12,340
Union County, bituminous.....	3.9	37.1	49.7	9.3	3.5	12,830
MARYLAND. ^b						
Georges Creek basin, semibituminous, high rank.....	.6	16.6	72.1	10.7	1.3	13,380
Georges Creek basin, semibituminous, medium rank.....	.6	17.7	73.0	8.7	1.4	14,010
Georges Creek basin, semibituminous, low rank.....	.7	20.3	70.0	9.0	1.4	14,010
Upper Potomac basin, semibituminous.....	.9	18.1	71.9	9.1	1.7	14,010
Upper Potomac basin, semibituminous.....	1.7	19.0	68.1	11.2	1.6	13,450
Castleman basin, semibituminous.....	2.1	22.0	67.1	8.8	2.3	13,870
Castleman basin, bituminous.....	.7	24.0	66.8	8.5	1.4	13,970
Upper Youghiogheny basin, bituminous.....	1.2	23.0	63.9	11.9	2.1	13,260
Lower Youghiogheny basin, bituminous.....	2.3	25.5	64.4	7.8	1.1	13,780
MICHIGAN.						
Saginaw district, bituminous.....	11.9	31.5	49.8	6.8	1.2	11,780
MISSOURI.						
Putnam County, bituminous.....	18.5	32.6	39.0	9.9	4.1	10,040
Harrison County, bituminous.....	15.3	37.1	40.8	6.8	3.0	10,100
Adair County, bituminous.....	15.4	34.8	38.8	11.0	3.6	10,460
Grundy County, bituminous.....	11.7	38.8	38.8	10.7	5.1	11,020
Macon County, bituminous.....	13.8	34.7	41.8	9.7	3.3	10,960
Randolph County, bituminous.....	12.1	36.3	42.9	8.7	3.9	11,450
Audrain County, bituminous.....	10.4	39.3	38.0	12.3	4.9	11,350
Ray County, bituminous.....	15.8	32.8	41.5	9.9	3.0	10,620
Lafayette County, bituminous.....	12.3	34.4	42.0	11.3	4.6	11,000
Henry County, bituminous.....	10.6	37.2	40.7	11.5	3.6	11,250
Bates County, bituminous.....	7.8	35.5	44.0	12.7	5.2	11,740
Vernon County, bituminous.....	6.5	32.6	50.8	10.1	5.0	12,460
Barton County, bituminous.....	5.4	32.1	53.6	8.9	3.6	12,990

^a Analysis made by the Iowa State University.^b Analyses made by the Maryland Geological Survey. Each analysis is the average of all analyses of a certain coal bed in that basin or field.

Analyses of representative coals of the United States—Continued.

Location and rank of coal.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Heat value (British thermal units).
MONTANA.						
Culbertson district, lignite.....	40.8	25.2	27.8	6.2	0.7	6,150
Glendive district, lignite.....	34.6	35.3	22.9	7.2	1.1	7,090
Miles City district, subbituminous (?).....	29.2	26.2	35.4	9.2	.8	7,670
Havre district, subbituminous.....	25.6	27.9	39.2	7.3	.6	8,290
Cutbank district, bituminous.....	6.6	40.3	39.2	13.9	3.1	10,930
Lewistown district, bituminous.....	8.0	26.6	56.1	9.3	4.4	11,510
Sand Coulee district, bituminous.....	6.0	28.4	51.4	14.2	2.4	11,150
Roundup district, subbituminous.....	13.4	32.4	47.6	6.6	.4	11,120
Bridger district, bituminous.....	9.8	27.6	46.2	16.4	.6	10,240
Bear Creek district, subbituminous.....	10.7	34.1	46.1	9.1	1.5	10,800
Red Lodge district, subbituminous.....	11.7	36.1	40.2	12.0	1.1	9,790
Trail Creek field, bituminous.....	12.4	36.8	42.3	8.5	.6	10,950
Electric field, bituminous, coking.....	4.0	22.5	59.3	14.2	.6	12,760
Missoula field, lignite.....	24.7	29.3	26.1	19.9	.9	6,730
NEVADA.						
Esmeralda County, bituminous.....	2.1	33.7	33.7	30.5	7.2	9,590
NEW MEXICO.						
Raton field, bituminous, coking.....	2.1	36.1	50.2	11.6	.6	12,970
Los Cerrillos field, anthracite.....	5.7	2.2	86.1	6.0	.7	13,270
Los Cerrillos field, bituminous.....	3.2	41.4	44.4	11.0	1.6	12,450
Carthage field, bituminous, coking.....	3.0	38.0	51.6	7.4	.9	13,260
White Oaks field, bituminous.....	2.5	37.9	44.9	14.7	.8	12,260
Monero district, bituminous, coking.....	3.0	39.0	48.3	9.7	3.5	12,930
Gallup district, subbituminous.....	12.7	36.5	43.3	7.5	.7	11,230
NORTH DAKOTA.						
Ward County, lignite ^a	36.5	28.4	28.7	6.4	1.4	6,750
Mountrail County, lignite ^a	37.8	30.1	24.3	7.8	.6	6,230
Williams County, lignite.....	41.1	27.2	26.3	5.4	.7	6,490
Northern McLean County, lignite ^a	40.0	29.7	27.1	3.2	.3	6,610
Southern McLean County, lignite.....	40.5	27.1	27.4	5.0	.8	6,640
Morton County, lignite.....	38.5	27.6	26.6	7.3	1.3	6,700
Stark County, lignite.....	42.1	24.5	25.7	7.7	1.1	6,160
Billings County, lignite ^a	37.0	26.3	28.7	8.0	1.8	6,590
Adams County, lignite.....	32.4	30.9	28.1	8.6	1.5	7,330
Bowman County, lignite.....	41.4	23.9	28.4	6.3	.7	6,240
OHIO.						
Stark County, bituminous ^b	6.7	36.2	48.9	8.2	2.7	12,560
Tuscarawas County, bituminous ^b	4.7	39.2	49.9	6.2	3.3	12,770
Jefferson County, bituminous.....	4.1	38.5	49.7	7.7	3.7	13,150
Coshocton County, bituminous ^b	4.5	38.7	50.8	6.0	3.6	12,910
Belmont County, bituminous.....	3.9	43.1	43.9	9.1	4.4	12,840
Guernsey County, bituminous.....	6.0	34.2	52.0	7.8	2.0	12,720
Noble County, bituminous.....	3.6	41.5	44.4	10.5	4.9	12,510
Perry County, bituminous ^b	6.7	37.1	49.1	7.1	2.6	12,390
Washington County, bituminous ^b	3.4	37.9	49.1	9.6	5.0	12,750
Hocking County, bituminous ^b	7.5	34.0	52.6	5.9	.8	12,510
Meigs County, bituminous ^b	7.2	32.8	50.7	9.3	1.3	12,000
Jackson County, bituminous ^b	5.3	41.0	45.3	8.4	3.7	12,210
Lawrence County, bituminous.....	7.1	33.7	50.3	8.9	1.3	12,090
OKLAHOMA.						
Craig County, bituminous.....	4.1	37.4	48.3	10.2	6.1	12,920
Rogers County, bituminous.....	4.2	38.2	47.8	9.8	5.2	13,910
Tulsa County, bituminous.....	6.3	37.7	47.8	8.2	8.2	12,690
Okmulgee County, bituminous.....	7.5	32.9	51.0	8.6	1.5	12,410
Haskell County, semibituminous.....	2.7	21.1	69.9	6.3	.8	14,100
Le Flore County, semibituminous.....	3.1	31.7	58.9	6.3	.9	14,020
Latimer County, bituminous.....	3.0	36.0	55.9	5.1	1.1	13,710
Pittsburg County, bituminous.....	3.6	33.4	58.0	5.0	.5	13,740
Coal County, bituminous.....	6.5	39.0	45.2	9.3	3.7	11,840

^a Analyses made by North Dakota Geological Survey.^b Analyses made by the Ohio Geological Survey.

Analyses of representative coals of the United States—Continued.

Location and rank of coal.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Heat value (British thermal units).
OREGON.						
Coos Bay field, subbituminous.....	18.0	31.8	39.7	10.5	2.2	8,910
Eden Ridge field, bituminous.....	12.6	35.0	37.7	14.7	1.3	10,350
PENNSYLVANIA.						
Anthracite region, anthracite.....	2.8	1.2	88.2	7.8	.9	13,300
Do.....	2.2	5.7	86.2	5.9	.6	13,830
Sullivan County, semianthracite.....	3.4	9.3	75.6	11.7	.8	13,120
Tioga County, semibituminous.....	2.3	20.9	66.9	9.9	1.3	13,620
Elk County, bituminous.....	2.7	33.7	54.9	8.7	2.9	13,470
Center County, semibituminous.....	2.9	19.9	69.7	7.5	1.9	14,080
Center County, bituminous.....	3.5	23.7	61.6	11.2	2.7	13,060
Clearfield County, semibituminous.....	3.3	19.9	69.0	7.8	2.0	14,020
Clearfield County, bituminous.....	2.8	24.3	66.3	6.6	.9	14,130
Indiana County, bituminous.....	1.0	26.1	63.8	9.1	2.7	13,950
Butler County, bituminous.....	4.6	33.0	54.4	8.0	1.3	13,200
Cambria County, semibituminous, high rank.....	3.3	12.5	77.9	6.3	1.0	14,340
Cambria County, semibituminous, low rank.....	2.0	21.2	70.9	5.9	1.2	14,510
Cambria County, bituminous.....	3.1	26.0	64.4	6.5	1.4	14,160
Westmoreland County, bituminous, coking.....	2.7	30.4	57.8	9.1	1.3	13,610
Allegheny County, bituminous.....	3.7	34.0	56.8	5.5	1.4	13,870
Broadtop field, semibituminous.....	2.1	15.5	76.0	6.4	1.1	14,470
Somerset County, semibituminous, high rank.....	2.5	12.5	78.8	6.2	1.1	14,380
Somerset County, semibituminous, low rank.....	2.6	21.5	68.0	7.9	1.7	13,900
Fayette County, bituminous, coking.....	2.8	30.0	59.8	7.4	1.2	13,990
Washington County, bituminous.....	1.4	34.6	57.8	6.2	.8	14,240
RHODE ISLAND.						
Portsmouth district, anthracite.....	13.2	2.6	65.3	18.9	.3	9,310
SOUTH DAKOTA.						
Harding County, lignite.....	41.5	24.0	24.3	10.2	.6	5,650
TENNESSEE.						
Claiborne and Campbell counties, bituminous.....	3.6	37.3	55.5	3.6	1.1	13,980
Scott and Fentress counties, bituminous.....	3.8	38.5	51.2	6.5	1.9	13,400
Anderson County, bituminous.....	2.2	37.2	54.5	6.1	1.6	13,960
Morgan County, bituminous.....	2.0	37.5	52.6	7.9	4.0	13,810
Roane and Rhea counties, bituminous, coking.....	2.2	29.6	59.4	8.8	.5	13,620
Cumberland County, bituminous.....	4.3	25.7	62.5	7.5	.6	13,630
Overton County, bituminous.....	3.4	35.6	50.6	10.4	3.1	12,990
White County, bituminous.....	3.0	39.7	46.9	10.4	4.1	13,950
Hamilton County, bituminous.....	2.9	29.9	59.2	8.0	1.2	13,760
Bledsoe and Sequatchie counties, bituminous.....	3.0	29.8	58.9	8.3	1.0	13,560
Grundy County, bituminous.....	3.6	29.8	57.9	8.7	1.4	13,330
Marion County, bituminous.....	3.4	28.2	60.1	8.3	.8	13,430
TEXAS.						
Houston County, lignite.....	33.5	39.5	16.2	10.8	.6	7,140
Wood County, lignite.....	28.9	35.9	27.3	7.9	.5	8,000
Milam County, lignite.....	36.0	27.9	28.7	7.4	.8	7,130
UTAH.						
Summit County, subbituminous.....	14.2	36.0	44.8	5.0	1.4	10,630
Uinta County, bituminous.....	8.6	36.1	47.2	8.1	1.4	11,580
Grand County, bituminous.....	7.1	37.0	45.4	10.5	.7	11,720
Carbon County, bituminous.....	4.4	38.2	50.5	6.9	.8	12,760
Emery County, bituminous.....	7.2	42.2	44.8	5.8	.7	12,540
Iron and Kane counties, anthracite.....	8.2	4.4	58.0	29.4	2.3	8,910
Iron and Kane counties, semibituminous.....	9.5	13.2	49.2	28.1	3.6	8,860
Iron and Kane counties, bituminous.....	10.4	36.3	43.7	9.6	5.8	10,870

Analyses of representative coals of the United States—Continued.

Location and rank of coal.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Heat value (British thermal units).
VIRGINIA.						
Appalachian region:						
Tazewell County, semibituminous.....	3.8	15.5	77.8	2.9	0.6	14,860
Buchanan County, semibituminous.....	2.4	19.6	64.6	13.4	.7	13,160
Buchanan County, bituminous.....	3.5	31.9	60.9	3.7	1.5	14,390
Dickinson County, bituminous.....	3.0	32.4	58.4	6.2	1.6	14,030
Russell County, bituminous.....	2.8	34.9	56.5	5.8	.6	14,150
Wise County, bituminous, coking.....	2.5	31.7	60.3	5.5	.5	14,250
Lee County, bituminous.....	3.4	34.4	58.8	3.4	.6	14,136
Montgomery County, semibituminous.....	1.6	12.3	68.1	18.0	.5	12,340
Richmond Basin, bituminous.....	2.8	25.7	62.5	9.0	1.4	13,490
WASHINGTON.						
Whatcom County, anthracite.....	4.4	7.4	76.0	12.2	1.0	12,590
King County:						
Newcastle district, subbituminous.....	12.1	36.8	40.7	10.4	.3	10,410
Grand Ridge district, subbituminous.....	15.9	36.0	38.5	9.6	.5	9,970
Snoqualmie district, bituminous.....	6.1	22.7	58.8	12.4	.9	10,710
Renton district, subbituminous.....	14.4	36.1	42.0	7.5	.6	10,560
Taylor district, bituminous.....	5.6	35.9	44.1	14.4	.9	11,550
Ravensdale district, bituminous.....	7.4	37.4	43.9	11.3	.5	11,500
Black Diamond district, bituminous.....	6.8	40.0	47.9	5.3	1.4	12,330
Bayne district, bituminous.....	4.1	32.8	52.8	10.3	.5	12,780
Pierce County:						
Burnett district, bituminous.....	3.2	35.0	49.3	12.5	.4	12,720
Gale Creek district, bituminous.....	2.8	33.8	53.9	9.5	1.0	13,450
Wilkeson district, bituminous, coking.....	2.5	27.7	61.3	8.5	.4	13,890
Wilkeson district, semibituminous.....	3.6	19.1	61.3	16.0	.5	12,320
Carbon Hill district, bituminous.....	3.4	32.2	49.5	14.9	.5	12,250
Fairfax district, bituminous.....	3.6	23.6	59.3	13.5	.4	12,750
Fairfax district, semibituminous.....	4.0	18.1	58.5	19.4	.5	11,820
Fairfax district, semianthracite.....	9.2	9.4	63.7	17.7	.7	11,130
Kittitas County:						
Beekman district, bituminous.....	3.3	34.1	50.5	12.1	.4	12,910
Roslyn district, bituminous.....	4.7	36.0	46.8	12.5	.4	12,240
Cle Elum district, bituminous.....	5.0	36.1	46.8	12.1	.4	11,900
Thurston County:						
Centralia district, subbituminous.....	21.0	33.1	36.7	9.2	.4	8,910
WEST VIRGINIA.						
Wheeling district, bituminous.....	4.1	36.6	53.3	6.0	2.1	13,400
Moundsville district, bituminous.....	3.4	41.6	48.0	7.0	3.3	13,310
Fairmont district, bituminous.....	2.9	34.5	56.9	5.7	.7	14,040
Clarksburg district, bituminous.....	2.8	38.5	53.1	5.6	2.4	14,110
Upper Potomac basin, semibituminous, high rank..	1.1	17.2	73.8	7.9	1.1	14,490
Upper Potomac basin, semibituminous, low rank..	1.2	20.4	70.8	7.6	1.0	14,520
Preston County, bituminous.....	3.6	27.4	62.8	6.2	.9	14,220
Buckhannon district, bituminous.....	2.5	32.5	56.3	8.7	1.7	13,590
Sutton district, bituminous ^a	2.3	38.3	52.9	6.5	2.1	13,530
Clay district, bituminous.....	2.8	35.5	54.7	7.0	.8	13,700
Winfield district, bituminous.....	5.0	39.6	48.3	7.1	1.8	13,000
New River field:						
New River district, semibituminous, high rank..	4.0	14.1	73.7	8.2	.8	13,850
New River district, semibituminous, low rank..	3.5	22.2	71.9	2.4	.7	14,690
Beckley district, semibituminous, high rank..	4.7	13.0	77.9	4.4	.8	14,340
Beckley district, semibituminous, low rank..	3.3	18.0	75.6	3.1	.8	14,660
Montgomery district, bituminous.....	2.4	35.5	56.7	5.4	1.0	14,160
Coalburg district, bituminous.....	3.4	35.2	53.1	8.3	.7	13,300
Logan district, bituminous.....	3.3	33.3	58.4	5.0	.7	14,050
Thacker district, bituminous, high rank.....	3.1	31.4	59.9	5.6	1.2	14,050
Thacker district, bituminous, low rank.....	4.5	38.8	50.9	5.8	2.0	13,370
Jaeger district, semibituminous.....	2.0	19.9	70.4	7.7	.7	14,110
Pocahontas field, semibituminous, low rank.....	3.4	22.5	68.8	5.3	.5	14,370
Widemouth district, semibituminous, medium rank.....	3.1	18.2	74.8	3.9	.7	14,690
Welch district, semibituminous, high rank.....	2.8	12.5	80.4	4.3	.7	14,660

^a Analysis by West Virginia Geological Survey.

Analyses of representative coal of the United States—Continued.

Location and rank of coal.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Heat value (British thermal units).
WYOMING.						
Sheridan district, subbituminous.....	22.6	32.5	40.4	4.5	0.3	9,220
Bighorn Basin field, subbituminous.....	16.5	32.9	45.8	4.8	.6	10,750
Black Hills region, bituminous, coking.....	10.0	39.1	34.3	16.6	4.9	10,250
Glenrock district, subbituminous.....	21.9	34.0	37.4	6.7	.9	9,070
Hudson district, subbituminous.....	21.1	31.4	41.7	5.8	.5	9,460
Hanna Basin field, subbituminous.....	11.5	42.6	39.3	6.6	.4	10,890
Rock Springs field, bituminous.....	9.8	34.3	52.5	3.4	1.0	12,260
Kemmerer district, bituminous.....	5.7	37.7	51.3	5.3	1.4	12,580
Kemmerer district, subbituminous.....	20.6	36.3	40.5	2.6	.5	10,240
Evanston district, subbituminous.....	14.4	36.8	41.6	7.2	.2	10,440

THE COAL FIELDS OF OHIO.

By J. A. BOWNOCKER.

INTRODUCTION.

ACKNOWLEDGMENTS.

In preparing this paper the writer made free use of previous publications on the coal and the coal fields of Ohio. Many acknowledgments are made in the text, but the contributions of Dr. Edward Orton and the chemical work of Profs. N. W. Lord and E. E. Somermeier deserve special mention. Prof. F. A. Ray has prepared the map of the Hocking Valley field, which shows for the first time in print the "great fault." He has also prepared a map of the Cambridge field showing its possible extensions to the northeast and a map showing the eastward extension of the Pomeroy field. Dr. C. R. Stauffer has placed at the writer's disposal a section of the Dunkard group, with notes, and Mr. Wilbur Stout has supplied data bearing on the lower coal beds of southern Ohio. Many analyses of coals have been taken from bulletins of the United States Geological Survey and the Bureau of Mines and still others from Bulletin 9 of the Ohio Geological Survey.

LOCATION, EXTENT, AND PRODUCTION.

The coal fields of Ohio lie in the eastern part of the State, extending from near the shore of Lake Erie in Geauga and Lake counties southwestward to Scioto and Lawrence counties, on Ohio River. An area of about 12,600 square miles, nearly one-third of the State, is underlain by coal-bearing rocks. These fields form the western rim of the great Appalachian trough, which extends for 850 miles southwestward from northern Pennsylvania to central Alabama and has a width of about 180 miles in its widest part.

The Ohio fields contain 11 coal beds that are regularly mined for railroad shipment. These beds, named and numbered from the bottom up, are the Sharon (No. 1), Quaker-

town (No. 2), Upper Mercer (No. 3a), Clarion (No. 4a), Lower Kittanning (No. 5), Middle Kittanning (No. 6), Upper Freeport (No. 7), Mahoning (No. 7a), Pittsburgh (No. 8), Pomeroy (No. 8a), and Meigs Creek (No. 9). Two other beds, the Brookville (No. 4) and Lower Freeport (No. 6a), are regularly mined at some places to supply local demand, and eight others are occasionally mined at favorable places.

The Ohio fields are favored by good shipping facilities, both by rail and river, and lie within easy hauling distance of Lake Erie and of large manufacturing cities. Further, the area is not far from the center of population of the United States. These facts have made Ohio one of the large coal-producing States. In 1915 it ranked fourth in coal mined, and its output was over 6 per cent of the total for the United States. The following figures show the growth and magnitude of the coal-mining industry in Ohio:

Coal mined in Ohio in certain years.

	Short tons.
1838.....	119,952
1850.....	640,000
1860.....	1,265,600
1870.....	2,527,285
1880.....	6,008,595
1890.....	11,494,506
1900.....	18,988,150
1913.....	36,200,527
1914.....	18,843,115
1915.....	22,434,691

The total coal produced in the State up to the end of 1915 is 723,956,352 short tons, or 6.64 per cent of the total quantity of coal mined to that date in the United States.

TOPOGRAPHY AND ACCESSIBILITY.

The coal-bearing area of Ohio is generally hilly and is most so in the counties that border Ohio River, where hills in places rise 500 feet. During the glacial epoch a great sheet of ice invaded the northern end of the coal

fields, planing down the hills and filling the valleys and completely modifying the surface. The ice extended as far south as middle Columbiana, southern Stark, and northern Holmes counties. Consequently the counties of Portage, Mahoning, Columbiana, Stark, Summit, and Medina, lying north of this border, are in places rolling and in places nearly flat.

Numerous streams trench the coal-bearing rocks and along their western border have cut through them and are now at work on the underlying Mississippian formations. The Cuyahoga, Mohican, Walhonding, and Hocking are examples of such streams. Other streams that deeply trench but do not cut through the coal-bearing rocks are Ohio, Tuscarawas, Muskingum, Little Muskingum, and lower Hocking rivers.

The coal outcrops not only at its proper place along the western margin of the coal fields but also in many places in valleys miles east of the margin. The eastward dip of the strata is slight and carries the coal below drainage gradually, so that deep shafting is at present necessary in only a few places. It follows, therefore, that the coal is accessible to an unusual degree in comparison with that of many States.

The coal fields of Ohio are well supplied with railroads, being crossed by several of the large east-west systems and by other roads, which lead directly to the Great Lakes. These main lines, together with their many branches, make accessible almost all parts of this large region. Ohio River, which has trenched its way through the coal fields from Pittsburgh to a point below Ironton, should be one of the great highways for the movement of heavy freight, such as coal, but the shallowness of its water during the summer has prevented the development of such a trade. The Government is, however, engaged in building locks and dams to produce slack water deep enough for navigation, and when all these are completed it is supposed that much of the freight originating in this inland region will reach the coast by Ohio and Mississippi rivers.

GEOLOGIC STRUCTURE.

The coal-bearing rocks of Ohio are part of the great structural trough of the Appalachians. (See Pl. II, in pocket.) The deepest

part of this trough is in West Virginia along a line running almost direct from Pittsburgh, Pa., to Huntington, W. Va. Toward this deepest part the rocks dip on both sides, those in Ohio dipping generally southeastward from the outermost limit of the coal fields.

Although the coal-bearing rocks dip generally southeastward at a gentle rate they show many local exceptions, the most prominent of which are due to low folds or anticlines. Orton says:

There are some points, and especially in eastern Ohio, where the dip rises to 1° , which gives an inclination of 1 foot in 57 feet, or, in other words, about 93 feet to the mile, but the usual limits are between 20 and 40 feet to the mile. Throughout a considerable part of the Hocking Valley, for example, the dip is quite steady at an average of 27 feet to the mile, its direction here being about 65° east of south.

Some of the most marked variations from the monotonous southeastern dip are found in Washington County, especially along Cow and Newell runs. On the bank of Ohio River, a short distance above the mouth of Newell Run, the Cambridge limestone is above drainage level and its vertical displacement, due to the arching of the rocks, is about 600 feet. On Cow Run the rocks form a dome, from whose center the coal dips away in all directions. This arch has raised both the Pittsburgh and Meigs Creek coal beds above drainage over a small area. The Cambridge anticline is one of the most prominent in eastern Ohio and causes the coal beds west of Cambridge to rise instead of dip eastward, as they normally would. Another departure from the normal is found in the southeastern corner of Belmont County, where for several miles a fold lifts the Pittsburgh coal above the beds of Captina Creek. Between Wellsville and East Liverpool is another low arch, but the coal in this locality is thin and the effect of the arch, so far as coal is concerned, is unimportant. The most notable upturning of rocks in the coal measures is near Mineral City, in Tuscarawas County, where the strata at one place are nearly vertical and the effects on the mining of the coal great. Small arches occur in the eastern part of Harrison County (where the Pittsburgh coal occurs), in central Belmont County, and in a few places in counties to the southwest.

THE COAL BEDS.

GENERAL FEATURES.

The coal-bearing rocks of Ohio are all of Carboniferous age and are limited to the upper part of this system. The Carboniferous system, as recognized by the United States Geological Survey, consists of three series, named from above downward, the Permian, Pennsylvanian, and Mississippian. The coal-bearing rocks belong to the Pennsylvanian series and to such part of the Permian series as is present.

The Permian and Pennsylvanian coal-bearing strata of Ohio, like those farther east, are divided into several formations,¹ the Dunkard group ("Upper Barren Coal Measures"), including Greene and Washington formations; the Monongahela formation ("Upper Productive Coal Measures"); the Conemaugh formation ("Lower Barren Coal Measures"); the Allegheny formation ("Lower Productive Coal Measures"); and the Pottsville formation ("Conglomerate group").

Most of these formations, to which Orton assigned an aggregate maximum thickness of 1,700 feet, possess individuality; but the Pottsville and Allegheny grade into each other and the line of their separation is drawn somewhat arbitrarily. The Conemaugh contains a few thin coal beds, only one of which is now worked for railroad shipment and that at a single place. Shale predominates in this formation, but sandstone is common, and several thin beds of fossiliferous limestone occur, notably the Brush Creek, Cambridge, and Ames members, of marine origin. The formation is limited below by the top of the Upper Freeport (No. 7) coal and above by the base of the Pittsburgh (No. 8) coal bed. No formation in the Pennsylvanian is more definitely bounded.

The Monongahela formation has for its basal member the noted Pittsburgh coal bed, which in many places is very prominent on account of its thickness, and in other places is thin and inconspicuous. The upper limit of the formation is marked by the horizon of the Waynesburg coal, the coal itself being generally thin or wanting. The Dunkard group, which includes the highest formations in the geologic column in Ohio, forms the summit of the hills

in the southeastern part of the State and is without workable coal beds—workable in this report being applied to beds which are either being mined at the present time or are of a thickness about equal to such beds. In general, the limit of workability at the present time in Ohio is about 2 feet.

COAL BEDS IN THE POTTSVILLE FORMATION.

GENERAL FEATURES.

The Pottsville formation, formerly known as the "Conglomerate group," which according to Orton is 250 feet thick, extends irregularly from Trumbull County southwestward to Scioto County. It is broadest in northern Ohio, where it has a maximum width of approximately 40 miles, and it narrows southwestward to perhaps less than 16 miles. Its basal member is the "Pottsville" or Sharon conglomerate, and its summit is formed by the Homewood sandstone member. Overlying the Homewood is the Brookville coal, which constitutes the basal member of the Allegheny formation. It must be confessed, however, that the upper limit of the Pottsville formation is not sharply marked and that, so far as Ohio is concerned, no very good reason exists for separating it from the overlying Allegheny formation. However, the Ohio geologists have always accepted the classification of Pennsylvania workers, who divided the lower coal measures into two formations, and it seems best to continue that division. The following table shows the sequence of coals and interbedded rocks as given by Orton:

General section of the Pottsville formation in Ohio. "

Homewood sandstone.
Tionesta (No. 3b) coal.
Upper Mercer group:
Ore.
Limestone.
Upper Mercer (No. 3a) coal.
Lower Mercer group:
Ore.
Limestone.
Lower Mercer (No. 3) coal.
Upper Massillon sandstone.
Quakertown (No. 2) coal.
Lower Massillon sandstone.
Sharon (No. 1) coal.

SHARON (NO. 1) COAL BED.

The Sharon is the lowest of Ohio coal beds and is workable in only the extreme parts of the coal fields of the State—Massillon and vicinity

¹ Prosser, C. S., Ohio Geol. Survey, 4th ser., Bull. 7, p. 4, 1905.

in Stark County and Jackson and vicinity in Jackson County.

Massillon field.—The Massillon field is by far the larger producer; in fact, were it not for that field the coal would scarcely be noticed in these pages. The area of the Massillon field is, however, small, though it includes parts of four counties. At present the coal is mined for railroad shipment in parts of Lawrence and Tuscarawas townships, Stark County; part of Sugar Creek Township, Wayne County; a small area near Nimisila, a hamlet in Franklin Township, Summit County; and near Deerfield station in the extreme southeast corner of Portage County. However, Lawrence and Tuscarawas townships of Stark County have always been considered the "heart of the bed," and the best of the coal is still found within their borders. East of Tuscarawas River the Sharon coal is nowhere present in the vicinity of Massillon but is found to the north in Summit County. The coal is known in the market as the Massillon coal. In July, 1915, 14 mines had railroad connection. The annual production of the field 15 years ago was about 1,000,000 tons; in 1915 it was about 500,000 tons, and it will continue to decrease year by year until the bed is exhausted. A little prospecting with the drill is occasionally done, but the life of the field will probably not extend much beyond 10 years.

The Geological Survey of Ohio has never mapped this coal for the reason that it does not form or even resemble a continuous bed but consists of a series of basins or pockets whose limits can be determined only by drilling or mining. The largest basin or pocket is said to have had an area of about 300 acres; and at present mines for railroad shipment are opened in basins having no greater area than 10 acres. Many of the basins contain masses of rock, known as horsebacks, whose area may vary from 1 to 5 acres. Commonly the coal bed thins and its quality deteriorates toward the margins of the basins, but in places it ends abruptly. Slope mining is possible in places where the streams have cut through the coal bed, and such mines are easy to drain, but at present nearly all the mining is done through shafts, most of which are less than 200 feet deep.

The coal bed differs from other coal beds of Ohio in being without persistent partings.

Some pyrite is present, especially along the borders of the basins or where horsebacks occur. Nevertheless the coal is unusually free from impurities, greatly enhancing the esteem in which it has always been held. The bed, in greatest thickness, measures $4\frac{1}{2}$ to 5 feet, but it changes sharply and may pinch out in a short distance. Two feet is generally the minimum thickness now mined. A variation in thickness from 5 inches to 2 feet 6 inches is shown in figure 4, which represents two sections in Lawrence Township, Stark County. The changes are due to unevenness in both roof and floor, but perhaps more commonly to those in the roof. In places the floor is notably uneven, and the coal may lie on a low swell instead of a flat surface. Shale commonly forms the roof and clay the floor, but in places sandstone forms one or both.

The coal is open burning (that is, it does not fuse during combustion), lustrous, produces a good proportion of lump, and stands transportation well.

Films of calcium carbonate known as "white-cap" are common on the surface of the coal and give it a spotted appearance. The coal along the western margin of the field, although good, is not quite up to the highest standard of the bed. The great use of the coal has always been for domestic purposes. It is clean, ignites easily, makes a hot fire, and produces little ash. It contains an average of about $53\frac{1}{2}$ per cent of fixed carbon, 37 per cent of volatile matter, $5\frac{1}{2}$ per cent of moisture, and 4 per cent of ash. Fifteen samples gave an average of 4.2 per cent of ash, two of these showing less than 2 per cent and the highest 6.6 per cent. Cleveland has always been the principal market for the coal.

Formerly there was, in the Mahoning Valley, a small area of the Sharon coal which bore a fine reputation. It was known as the Mahoning block coal and was used raw in blast furnaces and for domestic purposes. This coal is at present shipped from the Mahoning Valley from only one mine near Lowellville, but it is worked in a small way for local use at other places.

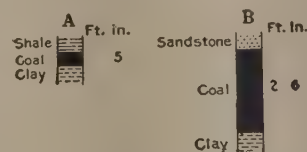


FIGURE 4.—Sections of Sharon (No. 1) coal bed in Lawrence Township, Stark County, northwest of Massillon, Ohio.

Jackson County.—The other field of Sharon coal lies in Jackson County, in the southern part of the State, but it is smaller and of much less importance than the Massillon field. It is locally known as the Jackson Shaft coal. The coal is at its best in both thickness and quality under the town of Jackson, where it measures 3 to 4 feet. (See fig. 5.) It was discovered in 1863 and is nearly worked out. It is found in scattered hills and ridges west of Jackson, especially in Liberty Township, and is mined for railroad shipment and for use among farmers. Two furnace companies mine the coal for their own use. Wilber Stout estimates that the area of Sharon coal of workable thickness in Jackson County is about 25 square miles but "due to wants, thin places, shaly conditions, and weathered outcrop, not to exceed 50 per cent of this is workable area."

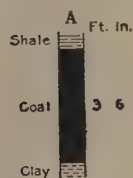


FIGURE 5.—Section of Sharon (No. 1) coal bed, Jackson, Jackson County, Ohio.

A sample of Sharon coal from Decatur mine No. 1, 5 miles west of Jackson, shows on analysis moisture 13.6, volatile matter 31.8, fixed carbon 50.4, ash 4.2, and sulphur 0.86 per cent. Its heat value is 11,680 B. t. u.¹

Other samples from the same general locality show a greater heating capacity, the highest being 14,220 B. t. u.

The coal bed commonly has an uneven floor and hence varies greatly in thickness. It is hard, dry burning,² low in ash, very low in sulphur, and is still used raw in the blast furnaces for making pig iron. It is excellent for domestic purposes.

QUAKERTOWN (NO. 2) COAL BED.

The Quakertown (No. 2) coal, known also as the Wellston or Jackson Hill bed, is the second coal in importance in the Pottsville formation. The position of this bed with reference to the Sharon is well shown by the following section, measured by Wilber Stout:

Section in sec. 18, Lick Township, Jackson County, Ohio.

	Ft. in.
Shale.....	10 0
Coal, Quakertown, reported thickness.....	2 6
Covered.....	24 0

¹ A British thermal unit (B. t. u.) is the quantity of heat required to raise the temperature of 1 pound of water 1° F. at or near 39.1° F., the temperature of maximum density. British thermal units may be reduced to pound calories by multiplying by 0.5556 and to French calories by multiplying by 0.252.

² The term dry burning is applied to a coal that does not fuse during combustion and that burns slowly.

	Ft. in.
Sandstone, massive.....	33 0
Covered.....	5 0
Shale, part covered.....	22 0
Coal, Sharon, reported thickness.....	2 8
Covered.....	2 0
Conglomerate, Sharon.....	40 0
	141 2

The one known important area of Quakertown coal is in Jackson County (Coal, Washington, and Milton townships), where, according to Orton, it was originally 9 miles long and had a maximum width of 4 miles. The coal was discovered by H. S. Bundy in 1872 in sinking a shaft for the Sharon or Jackson Shaft coal for furnace use. The coal soon proved its value for steam and domestic purposes, and its output grew rapidly, making Jackson County for a time first in coal production in the State. Although coal is obtained from other beds in the county, that derived from the Quakertown is by far the largest, and the variations in output are due largely to the conditions of mining in that bed.

Production in short tons of coal in Jackson County, Ohio.

1885	791, 608
1890	836, 449
1902	2, 412, 509
1910	878, 656
1913	587, 044
1914	532, 831
1915	565, 309

The maximum output was in 1902 and since that year production has declined notably and will doubtless continue to do so unless other beds in the county are much more extensively worked than they are at present.

Stout says that "The best of the entire field was in the vicinity of Wellston, where the bed had a regular thickness close to 4 feet [see fig. 6] and the coal was of excellent quality." The coal in this area is now exhausted, except for small blocks left in the old mines where the cover is thin or the dip such as to cause trouble from water. Eastward from Wellston the coal bed gradually thins, but no drill records defining this border of the field have been obtained. The largest body of minable Wellston coal at present lies in this area.

The coal is found in workable quantity along the southern border of Washington Township, but farther north, except in secs. 10 and 15, it is of such poor quality as to be worthless or is cut out entirely by sandstone.

Coal Township contained the largest area of the Quakertown coal, nearly its entire surface being underlain by it. Moreover, the thickness reached 4 feet and the quality rivaled the best in the field. However, the coal is practically exhausted.

The coal bed should lie above drainage in southern Lick, eastern Scioto, western Franklin, and eastern Hamilton townships, but it is

respects first class for domestic purposes. Another small pocket of this coal has been reported in the western part of Hocking County.

MERCER (NOS. 3 AND 3a) COAL BEDS.

General features.—The Lower Mercer (No. 3) and Upper Mercer (No. 3a) coal beds may be easily followed across the State because of the

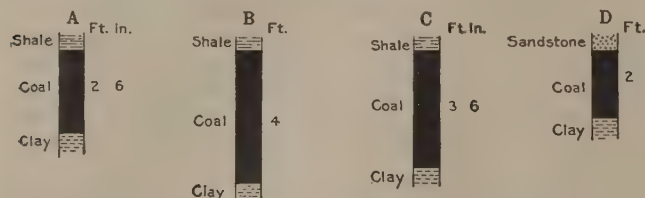


FIGURE 6.—Sections of Quakertown (No. 2) coal bed in Jackson County, Ohio. A, Jackson; B, Wellston; C, Glen Roy; D, Washington Township.

either wanting or is represented by only a few inches of coal or bony shale. For 25 years efforts have been made with the drill to discover minable coal on the east border of the county and farther east in Vinton County and thus extend the producing territory, but only small areas of good coal, most of the beds thin, have been discovered. The coal usually has an even floor, but in places it forms knolls, over which the bed is thin. The roof is of shale and of good strength.

The Wellston coal is fairly tender and does not stand mining and transportation well. It is bright and free from shale or clay except near the roof and floor. Sulphur and ash are low. The coal is open burning. As a domestic coal it is excellent, and it is to be regretted that its use could not have been restricted to that purpose. According to an analysis made by E. E. Somermeier of a sample taken in the Wainwright mine, in sec. 4, Milton Township, the coal shows moisture 9.3, volatile matter 33.0, fixed carbon 54.2, ash 3.5, sulphur 1.25, and nitrogen 1.39 per cent. Its heat value is 12,530 B. t. u.

Within the past few years a pocket of Quakertown coal has been located and mined in Elk Township, Vinton County, a few miles north of McArthur. The coal, where mined, usually ranges from 2 feet 6 inches to 4 feet in thickness. It has a shale roof, clay floor, and is free from impurities. The coal in places has a few inches of cannel and seems to be in all

limestones of the same names under which they lie. However, they are not of great value. The Lower Mercer, although mined in a few places for local use, is nowhere worked on a basis for railroad shipment. The Upper Mercer is mined in a larger way in Coshocton County.

Holmes, Mahoning, Tuscarawas, and Stark counties.—The relations of the Mercer to both the overlying and the underlying coals are shown in the following general section for Holmes County by A. A. Wright:

General section of the Mercer coals and the adjacent strata, Holmes County, Ohio.

	Feet.
Coal, Brookville (No. 4).	
Sandstone and shale.....	20
Coal, Tionesta (No. 3b).	
Sandstone, shaly.....	20
Limestone, Upper Mercer, thin.	
Coal, Upper Mercer (No. 3a).	
Shale.....	30
Limestone, Lower Mercer, thin.	
Coal, Lower Mercer.	
Shale.....	22
Coal (No. 2a).	
Sandstone, Upper Massillon.....	38
Coal, Quakertown (No. 2).	
Sandstone, Lower Massillon.....	40
Coal, Sharon (No. 1).	

170+

The Mercer coals and associated limestones are found in Mahoning County, and both coal beds are in places mined by farmers. The lower bed was once worked in a small way for railroad shipment in this county, and the upper bed has long been a local source of fuel near the village of Canfield. Both coal beds have been mined by farmers in Holmes and Tuscarawas counties, but both are much broken by partings in Holmes County and of little or no importance in Stark County. (See fig. 7.)

Coshocton County.—Western Coshocton County contains the best-known field of Mercer coal in Ohio. The Upper Mercer (No. 3a) coal, here known as the Bedford canal coal, is workable, according to Orton, over about 1,500 acres. It lies in the northern part of Bedford Township and the adjacent part of Jefferson. The coal has a maximum thickness of 9 feet, not all of which, however, is canal.

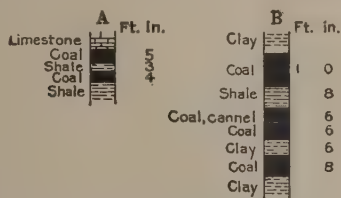


FIGURE 7.—Sections of Lower Mercer (No. 3) coal bed in Ohio. A, Hardy Township, Holmes County; B, Washington Township, Hocking County.

Sections show a bed of bituminous coal above the canal, but its quality is usually not good. (See fig. 8.)

Section of Upper Mercer coal bed in old Mowrie mine, Jefferson Township, Coshocton County, Ohio.

	Ft.
Limestone and flint, Upper Mercer.....	2
Coal, bituminous, upper part pyritiferous, lower part soft.....	3
Coal, canal.....	5
Clay.....	10

The canal is strong and tough and does not disintegrate when exposed to the weather or to transportation.

Muskingum and Licking counties.—Muskingum County has both Mercer coal beds, but here the lower is the more important. It has been mined in a very small way in Hopewell Township in the western part of the county, and just over the line in Licking County it constitutes the well-known Flint Ridge canal. The coal here is 3 to 4 feet thick and was formerly used for distilling illuminating oil. It contains some layers of shale, which makes it high in ash. Its area is small, and it is worked only for local needs.

Perry, Hocking, and Vinton counties.—Perry and Hocking counties have both coal beds, but it is rare that either attains a thickness of 2 feet. Vinton County makes a little better showing. Near Zaleski the Lower Mercer coal has a good thickness, but it is dirty and can not compete in the market with other coal

mined in this county. In Richland Township it is 28 inches thick and is worked by farmers. The Upper Mercer coal has long been mined for local use in the vicinity of McArthur, where it is known as the Newland coal. At its best the bed measures 5 feet, part of which is canal coal.

Jackson County.—The Lower Mercer coal has been mined by farmers in Hamilton and northern Washington townships, Jackson County, where it measures 24 to 30 inches and is of good quality. The Upper Mercer coal is also found in Jackson County with a thickness of 18 to 30 inches. Jefferson, Lick, and Bloomfield townships have the best beds, but even they are too thin to be of much value.

Scioto County.—In Scioto County the Lower Mercer coal is found in the eastern row of townships, but it does not exceed 24 inches in thickness. The Upper Mercer coal has long been mined for local use in the vicinity of South Webster, Bloom Township, where it is known as the Webster block coal. The bed usually is in two benches separated by a thin layer of clay or shale. The upper bench averages 16

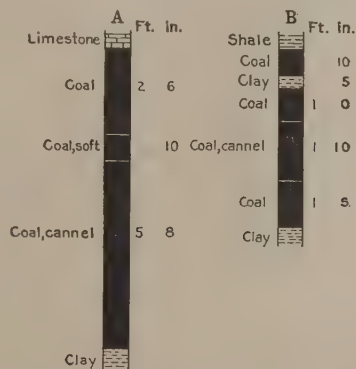


FIGURE 8.—Sections of Upper Mercer (No. 3a) coal bed in Ohio. A, Bedford Township, Licking County; B, Elk Township, Vinton County.

inches in thickness and the lower bench, where present, 6 to 8 inches.

Section of Upper Mercer coal bed on land of John Grant, in sec. 22, Bloom Township, Scioto County, Ohio.

	Ft. in.
Sandstone, shaly.....	1
Coal.....	3
Clay, plastic.....	2
Coal.....	8
Clay, plastic.....	4
	7 11

In mining, the undercutting is made in the clay below the coal, so that none of the fuel is lost. The coal burns with a long flame, owing to its large content of volatile matter, is non-clinkering, and is low in sulphur. It has an excellent reputation for domestic purposes. Near Bloom Junction the coal is a cannel, about 2 feet thick. This is the best-known and best-developed field of the Upper Mercer coal in southern Ohio.

Lawrence County.—Both coal beds are in Lawrence County, but neither is of much value. The Lower Mercer bed attains a thickness of 2 feet in Elizabeth Township and is occasionally mined by farmers. The Upper Mercer coal is mined in Hamilton, Upper, and Elizabeth townships. The section of the coal bed in these townships is similar to that at South Webster (p. 41); the upper bench has a maximum thickness of 2 feet and is of very good quality. The lower bench is about half as thick.

TIONESTA (No. 3b) COAL BED.

The Tionesta (No. 3b) is the highest coal bed in the Pottsville formation and has the least value. It lies 20 to 30 feet above the Upper Mercer limestone and is rarely of workable thickness even for local use.

Perhaps the best-known field of this coal is in Lawrence Township, Tuscarawas County, where the bed has been mined, off and on, for many years. It is known in that territory as the Bolivar coal. A section, measured by Orton, is as follows:

Section of Tionesta coal bed at Bolivar, Ohio.

	Feet.
Shale, dark.....	5
Coal, slaty.....	2
Clay and coal streaks.....	1
Coal.....	2
Clay.....	5

Near Jackson School, sec. 34, Richland Township, Vinton County, the Tionesta coal bed has a maximum thickness of 5 feet, but the coal is bony and high in ash. Shale overlying this coal in Vinton, Jackson, and Scioto counties is usually highly fossiliferous. At Monroe Furnace, Jackson County, the coal is mined for railroad shipment. The bed is about 4 feet thick and consists of two benches separated by an inch of shale. The area underlain by it, however, is small. The coal is mined for local use on Clinton Ridge in Vernon Township,

Scioto County, and it has been worked in Decatur and Washington townships, Lawrence County, where its maximum thickness is 3 feet.

COAL BEDS IN THE ALLEGHENY FORMATION.

GENERAL FEATURES.

The Allegheny formation, formerly known as the "Lower Productive Coal Measures," contains the most extensive and valuable coal beds of Ohio. It extends in outcrop from Mahoning to Lawrence County and, as reported by Orton, has a thickness of 250 feet. The Brookville (No. 4) coal is the lowest member of the formation and the Upper Freeport (No. 7) coal is the highest. The formation contains five coal beds that are now mined in a large way, and one of these is of workable thickness above drainage in every county where it is due.

Section of the Allegheny formation at Magnolia in southern Stark County, Ohio.

[By Edward Orton.]

	Ft.	in.
Coal, Upper Freeport (No. 7).....	2	0
Clay, shale, sandstone, and concealed.....	45	0
Sandstone, Lower Freeport, ¹ and conglomerate.....	30	0
Concealed.....	55	0
Coal, Middle Kittanning (No. 6).....	3	0
Clay.....	3	0
Shale.....	15	0
Coal.....	1	6
Shale.....	1	10
Coal, Lower Kittanning (No. 5).....	3	6
Clay.....	3	0
Shale and sandstone.....	5	2
Limestone, Putnam Hill.....	1	8
Coal, Brookville (No. 4).....	5	0
	174	8

The Lower Freeport (No. 6a) coal does not appear in the section. It probably lies in the "concealed" mass above the Freeport sandstone member.

Generalized section of the Allegheny formation in Lawrence County, Ohio.

[By Wilber Stout.]

	Ft.	in.
Coal, Upper Freeport (No. 7).....	3	0
Shale and sandstone.....	42	0
Coal, Lower Freeport (No. 6a).....	1	0
Shale and sandstone.....	37	0
Coal, Middle Kittanning (No. 6).....	1	4
Shale and sandstone.....	27	0
Iron ore, Red Kidney.....	4	0
Shale and sandstone.....	3	8
Clay, Oak Hill.....	3	0

¹ This is the Freeport sandstone member of United States Geological Survey reports.

	Ft.	in.
Shale.....	5	0
Coal, Lower Kittanning (No. 5):		
Coal.....	2	4
Clay.....	3	6
Coal.....	6	0
Clay.....	6	0
Shale and sandstone.....	6	6
Coal.....	12	0
Clay, shale, and sandstone.....	6	6
Iron ore, "Ferriferous".....	6	0
Limestone, Vanport ("Ferriferous").....	6	0
Shale, dark.....	1	0
Coal, Clarion (No. 4a):		
Coal.....	1	3
Clay shale.....	7	
Coal.....	1	4
Clay with pyrite.....	1	
Coal.....	1	0
Sandstone.....	18	0
Coal, Brookville (No. 4).....	2	0
	183	2

BROOKVILLE (NO. 4) COAL BED.

The Brookville (No. 4) coal bed is the basal member of the Allegheny formation. It lies immediately below the Putnam Hill limestone member and for that reason is easily identified. It can readily be traced across the State, but at present it is not an important source of fuel.

Stark County.—The best-known area of the Brookville coal is in Stark County. It is not mined for railroad shipment, though it is used in large quantity for burning lime, for fuel at Canton, and for domestic use in several villages and among the farmers. It is mined a mile southwest of the hamlet of Greentown, in Lake Township, and near New Berlin, where it is used in burning lime. The coal is reported to be 18 inches thick at Middlebranch. It extends practically across the county from north to south, but its width of outcrop is less definitely established. Orton mentions 4 miles, but near the southern border of the county there are workable areas 12 miles apart in an east-west direction. The largest mines are only a mile or two north of Canton, and that city furnishes an excellent market.

Section of Brookville coal bed in mine of Edgefield Coal Co., 2 miles north of Canton, Ohio.

[See fig. 9, A.]

	Ft.	in.
Shale.....	3	5
Limestone, Putnam Hill.....	5	
Coal, bony, not mined.....	2	5
Coal, "top".....	3	
Clay.....	1	0
Coal, "bottom".....	11	
Coal, bony, not mined.....	8	5
Total section.....	4	9

A few hundred feet from this section the "top" and "bottom" coal conjointly measure 4 feet 8 inches, but the company counts on only 3 feet 6 inches of good coal. Thin shale or clay partings are not common, but there is considerable pyrite. The coal is reached by a slope, but it lies so near the surface in the surrounding country that much of it has been removed by streams.

South of Canton the Brookville coal is mined in the vicinity of North Industry and Howenstein, and it has been worked in the vicinity of East Sparta. It is used for burning lime, and little or none of it is shipped by rail.

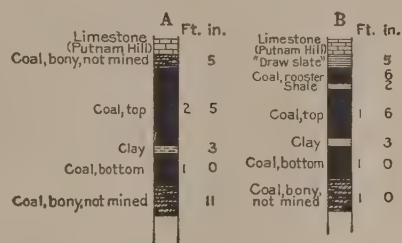


FIGURE 9.—Sections of Brookville (No. 4) coal bed in Stark County, Ohio. A, 2 miles north of Canton; B, 1 mile south of North Industry.

Section of Brookville coal bed in Agricultural & Commercial Lime Co.'s mine, 1 mile south of North Industry, Ohio.

[See fig. 9, B.]

	Ft.	in.
Limestone, Putnam Hill.....	4	0
"Draw slate".....	5	
Coal, Brookville:		
Coal, "Rooster," mined.....	6	
Shale.....	2	
Coal, "top".....	1	6
Clay.....	3	
Coal, "bottom".....	1	0
Coal, bony, not mined.....	1	0
	8	10

The quantity of the coal in this part of Stark County appears to be large, and though its quality is not first class it does very well for ordinary uses.

Section one-half mile east of Justus, southwest corner of Stark County.

[By Evan Lewis, deputy State mine inspector.]

	Ft.	in.
Mantle rock.....	15	0
Shale, dark.....	15	0
Coal, Middle Kittanning (No. 6).....	2	6
Clay.....	3	0
Shale, gray.....	25	0
Coal, Lower Kittanning (No. 5):		
Coal, bony.....	6	
Clay.....	4	

	Ft.	in.
Coal.....	2	0
Shale.....	1	
Coal.....	8	
Clay.....	5	0
Shale, gray.....	30	0
Limestone.....	3	0
Coal, Brookville (No. 4) (fig. 10, A):		
Coal.....	2	
Shale.....	1	
Coal.....	2	3
Clay.....	6	
Coal.....	2	0
Shale.....	1	4
Clay.....	5	0
Shale, gray.....	15	0
Coal, Upper Mercer (No. 3a):		
Coal, bony.....	10	
Coal.....	2	2
Clay.....	4	0
	135	5

The Lower Kittanning and Brookville coals are mined at this place, and plans are being made to work the Upper Mercer at an early date.

Tuscarawas and Coshocton counties.—The Brookville coal is commonly thin and unimportant in Tuscarawas County. In western Coshocton County it thickens and is an important source of fuel among the farmers in Jefferson, Bedford, and Newcastle townships, where it reaches a maximum thickness of 4 feet. The following section is reported by Orton:

Section of Brookville coal bed in Moore's mine, Jefferson Township, Coshocton County, Ohio.

	Ft.	in.
Limestone, Putnam Hill.....	2	
Shale, false roof.....	8	
Coal.....	1	
Shale.....	2	0
Coal.....	3	
Shale.....	8	
Coal.....	3	10

The coal is at least of fair quality and by some is preferred to the cannel coal of the vicinity.

Muskingum, Perry, and Hocking counties.—The Brookville coal is found in the western portion of Muskingum County, but here it is less than 3 feet thick and hence is of little importance. Years ago a small mine was opened in this bed at Zanesville. The coal is found in Perry and Hocking counties, but it is thin and not mined.

Vinton County.—The Brookville coal attains workable thickness in Vinton County, where it has long been mined in Elk, Swan, Madison, and Clinton townships under the name Winter's coal or "Flint vein," the latter name being given because of the presence in places of a bed of flint between the two benches of coal. This coal varies considerably in thickness in this vicinity, as is shown by the following section and also by figure 10, B.

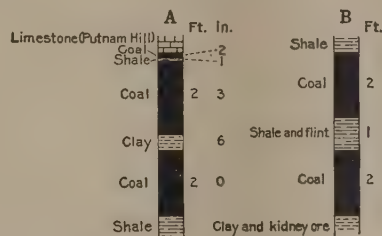


FIGURE 10.—Sections of Brookville (No. 4) coal bed in Ohio. A, Justus, Stark County; B, McArthur, Vinton County.

Section of Brookville coal bed at McArthur, Ohio.

	Ft.	in.
Shale.....	2	0
Coal.....	3	
Shale.....	2	0
Coal.....	4	3
Clay and kidney ore.....		

The coal was formerly worked at Zaleski for railroad shipment, but the mine was abandoned years ago. The coal varies considerably from place to place but is of fair quality for steam and domestic purposes.

Jackson County.—The Brookville coal is mined in a small way for railroad shipment in Milton Township, Jackson County.

Section of Brookville coal bed in mine of Minglewood Coal Co., sec. 24, Milton Township, Jackson County, Ohio.

	Ft.	in.
Coal.....	2	0
Clay.....	1	
Coal.....	8	
Shale, gray.....	1	4
Iron ore.....	2	
Shale, gray.....	3	
Coal.....	6	
	5	0

An analysis of the top layer of this coal shows 6.1 per cent of ash, 2 per cent of sulphur, and a heating value of 12,560 B. t. u.

Farther south in Jackson County the coal bed thins and has little or no value.

Lawrence County.—The coal is found in Lawrence County, but it is thin and has never been worked except in the smallest way.

CLARION (NO. 4a) COAL BED.

General features.—The Clarion (No. 4a) coal bed is easily recognized by its position under the Vanport or "Ferroferous" limestone, and for that reason it is often known as the "limestone coal." The coal is open burning, moderately hard, and in northern Ohio it is in places a cannel. It contains shale or clay impurities, and hence is high in ash; sulphur content also is large. However, the coal is suitable for steam and domestic purposes, and the day is not far distant when it will be eagerly sought. The coal bed in southern Ohio is nearly always divided into three benches by shale or clay partings whose thickness ranges from less than 1 inch to a foot. In northern Ohio it is a solid bed without definite partings.

Although the coal can be easily traced across the State, it is not of value except in the two opposite parts, northeastern Ohio and the extreme southern part of the State.

Columbiana County.—In Columbiana County the coal is mined in places. In the valley of North Fork of Little Beaver Creek, about a mile below Lisbon, the coal ranges from 2 feet 8 inches to 3 feet 4 inches in thickness, and contains some layers of shale or pyrite. It is used for domestic and steaming purposes. A dark brittle limestone, which lies 5 to 7 feet above the coal has been designated the "Ferroferous." The following is Orton's section, slightly changed, of the strata in the vicinity of Lisbon:

Section of the strata in the vicinity of Lisbon, Ohio.

	Ft.	in.
Coal, Upper Freeport (No. 7).....	3	4
Clay.....	2	0
Limestone, Upper Freeport.....	2	0
Unseen.....	23	0
Sandstone.....	20	0
Coal, Lower Freeport (No. 6a).....	1	0
Shale.....	7	0
Limestone, Lower Freeport.....	5	0
Sandstone, Freeport, and shale.....	50	0
Coal, Middle Kittanning (No. 6).....	8	
Sandstone.....	12	0
Coal, Lower Kittanning (No. 5).....	1	4
Shale.....	37	0
Limestone, Vanport ("Ferroferous").....	3	0
Coal, Clarion.....	3	0
Clay.....	4	6
Coal.....	1	6
	176	4

The Clarion coal is mined in the northern part of Columbiana County and is shipped from the Delmore mine, $1\frac{1}{2}$ miles west of Leetonia. The following section was measured in this mine:

Section of Clarion coal bed in Delmore mine, $1\frac{1}{2}$ miles west of Leetonia, Ohio.

	Ft.	in.
Shale.....	3	1
Coal.....	1	3
Shale, hard.....	9	
Coal.....	12	0
Clay.....	17	1

The coal has no regular partings, but shale and pyrite bands are not uncommon. The product of the mine is used largely for locomotives. The bench below the hard shale is not mined. It is reported to range from 6 to 12 inches in thickness but in places to be wanting. The Lower Kittanning or No. 5 coal was formerly mined in this vicinity.

The Clarion coal has long been mined in the vicinity of Canfield, Mahoning County, where it is a cannel and was formerly distilled for illuminating oil. Newberry says:

It is a very variable seam so far as regards thickness and character but is almost always present in one or another of its phases at the horizon where it belongs. In some localities it is 6 feet in thickness, all cannel coal of good quality; in others it is a remarkably pure bituminous coal $2\frac{1}{2}$ to 3 feet thick, while more generally it is found to have a thickness of about 3 feet, of which 6 to 10 inches of the upper part is cannel.

This coal bed has never been mapped in Columbiana and Mahoning counties, but it appears to occupy a large area and may be looked on as a reserve that will be eagerly sought when the thicker coal beds are a thing of the past.

The Clarion coal can be followed in outcrop from Columbiana County southwest to Vinton, where it again attains workable thickness. Between these distant counties the coal rarely if ever measures 2 feet in thickness and generally is represented by only a streak.

Lawrence County.—The one important field of the Clarion coal lies in Lawrence, Scioto, Jackson, and Vinton counties, where it is worked for railroad shipment as well as for local purposes. For many years the Wellston or Quakertown bed was mined because of its superior quality, and the Clarion bed was neglected, but the increasing demand for fuel and the scarcity of Wellston coal led to mining in the Clarion, which has now grown to considerable importance. With the exhaustion of the

better coal the Clarion will be more and more in demand.

The coal is above drainage in the western half of Lawrence County and is exposed in numerous places, especially in the northern part. The Vanport ("Ferriferous") limestone is well developed there, and by its aid the identification of the coal is easy.

Section of Clarion coal bed from mine of J. R. Edwards, sec. 23, Washington Township, Lawrence County, Ohio.

[See fig. 11, B.]

Limestone, Vanport ("Ferriferous").	Ft.	in.
Coal, upper bench.....	1	0
Shale.....	5	
Coal, middle bench.....	1	6
Shale.....	2	
Coal, lower bench.....	6	
Clay.....	3	7

The section shows only 3 feet of coal, but others in the county (see fig. 11, A) show as much as 4 feet 4 inches.

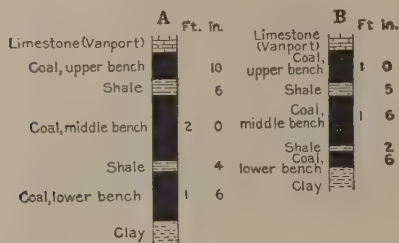


FIGURE 11.—Sections of Clarion (No. 4a) coal bed in Lawrence County, Ohio. A, Decatur Township; B, Washington Township.

The proximate analysis of a sample from this mine gives moisture 6.0, volatile matter 39.1, fixed carbon 43.0, and ash 11.9 per cent. The ultimate analysis gives carbon 63.32, hydrogen 5.26, oxygen 13.24, nitrogen 1.22, sulphur 5.10, and ash 11.86 per cent. The heating value is 11,730 B. t. u.

Scioto County.—In Scioto County the Clarion coal is limited to Bloom Township and is worked for railroad shipment in a single mine. The coal is similar in all respects to that in Lawrence County.

Jackson County.—Jackson County contains a large area of Clarion coal in its eastern tier of townships, Madison, Bloomfield, and Milton, and in each of these the coal is mined for railroad shipment as well as for use by farmers.

Section of Clarion coal bed in Pittinger mine, Wellston, Jackson County, Ohio.

[See fig. 12, A.]

	Ft.	in.
Coal, upper bench.....	11	1
Shale.....	9	
Coal, middle bench.....	1	4
Shale.....	1	1
Coal, lower bench.....	1	2
Clay.....	4	4

The proximate analysis of a sample from this mine shows moisture 5.3, volatile matter 41.0, fixed carbon 45.3, and ash 8.4 per cent. An

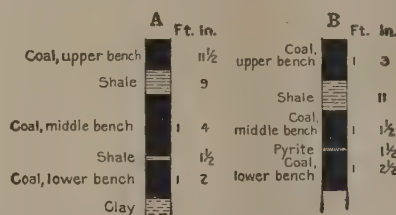


FIGURE 12.—Sections of Clarion (No. 4a) coal bed in Ohio. A, Wellston, Jackson County; B, Wilkesville, Vinton County.

ultimate analysis of the same sample gave carbon 66.52, hydrogen 5.50, oxygen 14.58, nitrogen 1.28, sulphur 3.72, and ash 8.40 per cent. The heating value is 12,290 B. t. u.

Vinton County.—Vinton County is the third source of Clarion coal, but the known workable areas are restricted to Wilkesville and Vinton townships, where it is mined and shipped on the Hocking Valley Railway. The limestone and coal are well exposed along Raccoon Creek, but east of this stream the coal in a short distance dips below drainage level.

Section of Clarion coal bed in Lawler mine, Minerton, Vinton County, Ohio.

	Ft.	in.
Coal, upper bench.....	1	6 1/2
Shale.....	6	1/2
Coal, middle bench.....	1	2
Shale.....	1	1
Coal, lower bench, including a pyrite band near bottom.....	1	1
Clay.....	4	5 1/2

The proximate analysis of a sample from this mine shows moisture 4.5, volatile matter 40.1, fixed carbon 46.5, and ash 8.9 per cent; the ultimate analysis shows carbon 67.17, hydrogen 5.44, oxygen 13.03, nitrogen 1.28, sulphur 4.23,

and ash 8.85 per cent. The heating value is 12,430 B. t. u. The character of the coal bed at Wilkesville is shown by figure 12, B.

LOWER KITTANNING (NO. 5) COAL BED.

General features.—The Lower Kittanning (No. 5) coal bed may readily be traced across the State from Columbiana County to Lawrence County. However, it is not everywhere of minable thickness according to present standards, and in fact is not now one of the largest sources of coal in Ohio. The general group of beds of which it is a part is one of great value, for a short distance below it lies the Vanport or "Ferriferous" limestone and ore, the former used in making Portland cement and the latter a source of iron for blast furnaces years ago. More important by far, however, than these is the great bed of clay that directly underlies the coal and that is so extensively used in the clay industries of eastern Ohio. About 25 feet above the Lower Kittanning coal lies the Middle Kittanning bed, and this is one of the two most important coals in Ohio, its only rival being the Pittsburgh bed. Between the two Kittanning coal beds there is found in places a bed of clay or shale that is suitable for the manufacture of clay wares. The sequence of these beds is as follows:

General sequence of the Middle and Lower Kittanning coal beds and underlying strata in Ohio.

Middle Kittanning (No. 6) coal.
Middle Kittanning clay.
Shale or sandstone.
Lower Kittanning (No. 5) coal.
Lower Kittanning clay.
"Ferriferous" iron ore.
Vanport ("Ferriferous") limestone.

Columbiana County.—The Lower Kittanning coal was formerly mined in a large way at Leetonia, Columbiana County, and was used for making coke for local blast furnaces. The following is Orton's section and comment on the coal at this place:

Section of Lower Kittanning coal bed at Leetonia, Ohio.

	Ft.	in.
Shale with kidneys and plates of iron ore.....	8	0
Coal.....		8
Parting.....		
Coal.....	1	8
Clay.....	2	6
	12	10+

The coal is found in two benches, the lower of which is much the purer. The upper bench often becomes slaty and cannel-like, and must then be rejected. The bottom coal, which is also called the Smith coal, is a cementing coal of pronounced character, but the upper bench never has this quality. * * * The bottom coal is also an exceptionally good fuel for rolling mill use. It burns with a bright blaze and gives out its heat quickly.

The area of the Leetonia field is small and the coal has not been mined for years except locally for domestic purposes. When the field was visited in 1915 not a mine was in operation, though one was being opened for local use near Washingtonville, where the section given in figure 13, A, was measured.

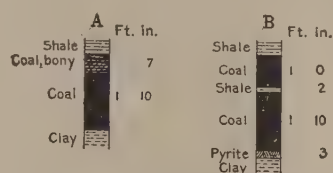


FIGURE 13.—Sections of Lower Kittanning (No. 5) coal bed in Ohio. A, Washingtonville, Columbiana County; B, Pike Township, Stark County.

Carroll, Stark, and Tuscarawas counties.—From Columbiana County the Lower Kittanning coal can be followed southwest through Stark and Carroll counties into the adjacent corner of Tuscarawas County. In Pike Township, Stark County, it has the thickness and character shown in figure 13, B. It is worked along Big Sandy Creek in the northwest corner of Carroll County, and it constitutes the well-known Mineral City bed in Tuscarawas County.

Section of Lower Kittanning coal bed from Huff Run mine No. 1, Mineral City, Ohio.

	[See fig. 14, A.]	Ft.	in.
Shale, dark.....			
Coal.....			8
Coal, bony.....			3
Coal.....			12
"Soot".....			2
Coal.....		1	1
Pyrite.....			1
Coal.....			4
"Soot".....			2
Coal.....			4
Coal, bony.....			3
Coal.....			9
Clay.....		3	6

The proximate analysis of a sample from this mine gave moisture 5.3, volatile matter

38.7, fixed carbon 48.3, and ash 7.7 per cent; the ultimate analysis gave carbon 69.75, hydrogen 5.46, oxygen 12.65, nitrogen 1.18, sulphur 3.25, and ash 7.71 per cent. The heating value is 12,900 B. t. u.

The rocks in the vicinity of Mineral City have been disturbed by crustal movements and form a prominent syncline, which of course has its effect on mining. Orton says: "There is no known portion of the coal field of Ohio where there has been a title of the disturbance that occurs in the vicinity of Mineral Point [Mineral City]."

The coal is mined by stripping for railroad shipment on the Hagg farm in Sandy Township, 2½ miles east of Sandyville, where the thickness ranges from 4 to 5 feet and the structure of the bed is similar to that recorded in the preceding section. The coal in this part of Tuscarawas County manifestly contains some impurity, but its heating value is good, and it ranks well as a steam producer. It is extensively used in burning clay wares. From Sandy Township the Lower Kittanning coal can be followed southwest across the county. It has been mined in both large and small ways between Mineral City and Canal Dover, but southwest from Canal Dover it is thin and has little value. The coal is of little or no importance in Holmes and Coshocton counties.

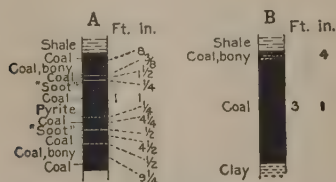


FIGURE 14.—Sections of Lower Kittanning (No. 5) coal bed in Ohio. A, Mineral City, Tuscarawas County; B, Toronto, Jefferson County.

The lower Kittanning coal is also mined in a small way in the bluffs of Ohio River in Jefferson County. A section of the bed at Toronto is represented in figure 14, B.

Guernsey County.—In Guernsey County the Lower Kittanning coal is found in the valley of Wills Creek for several miles south of Kimbolton and is reported to have a thickness as great as 4 feet 9 inches.

Muskingum County.—The Lower Kittanning coal is not of great importance in Muskingum County and as far as now known is of workable thickness in only two areas, the vicinity of

Zanesville and Newton Township. The Zanesville area is small and the coal is known as the "4-foot bed." It has long been used at Zanesville for domestic and other purposes and is rated as a good fuel.

Section of Lower Kittanning coal bed in old Harper mine near Zanesville, Ohio.

	Ft. in.
Coal.....	1 0
Parting.....	2
Coal.....	2 0
Shale.....	1
Coal.....	1 0
	4 3

Newton Township forms the southwestern corner of Muskingum County, and the Lower Kittanning coal is there of importance.

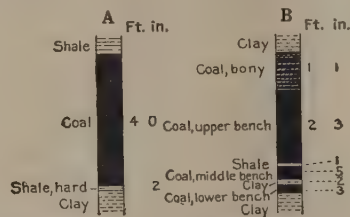


FIGURE 15.—Sections of Lower Kittanning (No. 5) coal bed in Ohio. A, Redfield, Perry County; B, Milton Township, Jackson County.

Perry County.—The coal extends from Muskingum into northeastern Perry County, where it is mined at Redfield (fig. 15, A) and a mile or two east of New Lexington for railroad shipment and for local use, and is locally known as the Lower New Lexington or 4-foot bed. The coal in places is without partings and may be free from dirt, but the floor rises and falls, causing the thickness of the bed to vary.

Section of Lower Kittanning coal bed in Copelin mine, sec. 2, Pike Township, Perry County, Ohio.

	Ft. in.
Shale.....	
Coal, upper bench.....	6
Coal, horn ¹	1
Coal, middle bench.....	1 0
Parting.....	½
Coal, lower bench.....	1 9
Clay.....	3 4½

The proximate analysis of a sample from this mine gave moisture 6.8, volatile matter 35.2, fixed carbon 47.8, and ash 10.2 per cent; an ultimate analysis gave carbon 64.78,

¹ The term "horn coal" here means an impure cannel but is used by some to designate any lean, impure coal or bone.

hydrogen 5.26, oxygen 13.86, nitrogen 1.22, sulphur 4.72, and ash 10.16 per cent. The heating value is 11,860 B. t. u.

The coal underlies the southern townships of the county and has been mined for local use at several places. Perry County contains a large acreage of the Lower Kittanning coal of suitable thickness and quality for mining in a large way, but its development has been retarded by the presence of the Middle Kittanning bed, which is thicker and generally more desirable.

Hocking, Vinton, and Jackson counties.—The Lower Kittanning coal is thinner and of smaller value in Hocking County and still less so in Vinton County, but it thickens in eastern Jackson County, where it is mined in a small

The proximate analysis of a sample from this mine shows moisture 8.1, volatile matter 34.5, fixed carbon 47.7, and ash 9.7 per cent; an ultimate analysis gives carbon 65.54, hydrogen 5.44, oxygen 15.95, nitrogen 1.23, sulphur 2.13, and ash 9.71 per cent. The heat value is 11,930 B. t. u.

The coal is open burning, rather soft, moderate in ash and sulphur. It makes a fair coke but is not used for that purpose. It is well adapted for steam and domestic uses and is the main reliance of the city of Ironton. The field is the most valuable one of this bed in Ohio, and the coal is extensively mined for railroad shipment.

MIDDLE KITTANNING (NO. 6) COAL BED.

The Middle Kittanning (No. 6) coal, on account of its quantity and quality, is the most valuable in Ohio. It is found along the State line in Columbiana County and can not only be followed with ease across the State to Lawrence County on Ohio River but it is workable in every county where it should appear above drainage and in most of them on a large scale. The bed lies 20 to 35 feet above the Lower Kittanning coal and is generally easily identified.

Columbiana County.—The Middle Kittanning coal underlies much of the eastern and southern parts of Columbiana County, and its relations to lower beds are well shown in the following section measured by Orton:

Section at Robbinsville, Ohio.

	Ft. in.
Sandstone, Freeport ("Lower Freeport").....	20 0
Coal, Middle Kittanning (No. 6).....	8
Sandstone and shale.....	15 0
Coal, Lower Kittanning (No. 5).....	1 4
Shale and ore nodules.....	40 0
"Draw slate".....	1 0
Coal, Clarion (No. 4a).....	3 0
Clay.....	4 0
Coal.....	1 8
	86 8

The coal bed in Columbiana County is less than 3 feet thick and has not been worked in a large way, but it has been mined for local use in Dry Run near East Liverpool. The coal is clean, of good quality, mines with much lump, and has an excellent reputation.

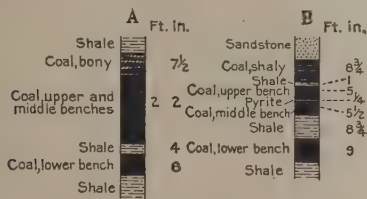


FIGURE 16.—Sections of Lower Kittanning (No. 5) coal bed in Lawrence County, Ohio. A, Etna, Elizabeth Township; B, Coalgrove, Perry Township.

way for railroad shipment. The bed is irregular but ranges from 3 to 4 feet in thickness over hundreds, perhaps thousands of acres. A section of the coal bed in Milton Township is represented in figure 15, B.

Lawrence County.—The coal is still more valuable in Lawrence County, across which it can be readily traced to Ohio River, in whose bluff it is mined at Coalgrove. A section of the coal bed at this place is shown in figure 16, B. It is worked in Washington, Decatur, Elizabeth, Upper, and Perry townships. It is rated at its best in Elizabeth Township.

Section of Lower Kittanning coal in Hocking Coal Co.'s mine No. 2, Etna station, Elizabeth Township, Lawrence County, Ohio.

[See fig. 16, A.]

	Ft. in.
Shale.....	7 ½
Coal, bony.....	2 2
Coal, upper and middle benches.....	4
Shale, gray.....	8
Coal, lower bench.....	3 9 ½
Shale.....	

Section of Middle Kittanning coal bed at mouth of Dry Run, Columbiana County, Ohio.

[See fig. 17, A.]

	Ft. in.
Shale.	
Coal, impure.....	4
Coal.....	1 6
Shale.....	3
Coal, impure.....	4
Clay.	2 5

A sample taken at this place showed 4.6 per cent ash, 1.76 per cent sulphur, and has a heating value of 14,020 B. t. u., which compares favorably with that of the best coals mined in Ohio.

Along Yellow Creek in the southern part of the county the Middle Kittanning coal has also been mined and is there known as the Hammondsville strip vein. It is thin and can not compete with large beds.

Stark County.—The Middle Kittanning coal extends from Columbiana County west into

Kittanning coal in Stark County is large, and in the not distant future the coal will be extensively mined.

Carroll County.—In Carroll County, which lies south of Columbiana and Stark counties, the Middle Kittanning coal is above drainage in Rose and Brown townships, where it has long been mined in a small way but does not appear to be of great value.

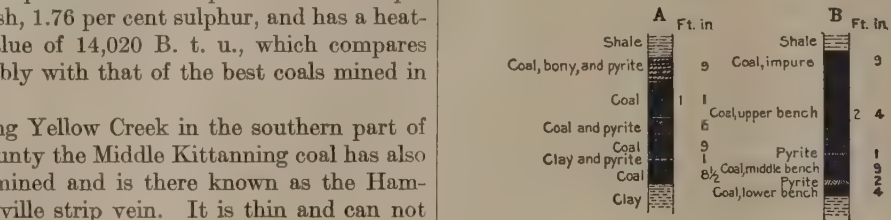


FIGURE 18.—Sections of Middle Kittanning (No. 6) coal bed in Tuscarawas County, Ohio. A, Somerdale, Fairfield Township; B, Gnadenhutten, Clay Township.

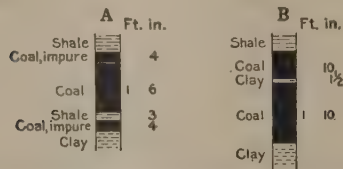


FIGURE 17.—Sections of Middle Kittanning (No. 6) coal bed in Ohio. A, East Liverpool, Columbiana County; B, Nimishillen Township, Stark County.

Stark, where it has workable thickness in the eastern and southern townships. At Waynesburg, in the southeast corner of Sandy Township, the bed has the following structure:

Section of Middle Kittanning coal bed in mine of Whitacre Fire-proofing Co., Waynesburg, Ohio.

	Ft. in.
Shale.	
Coal.....	1 1
Clay and pyrite.....	1 1 1/2
Coal.....	1 8 1/2
Clay.	3 11

A sample taken at this place showed 8.2 per cent ash, 2.66 per cent sulphur, and a heating value of 12,560 B. t. u. The coal is mined for railroad shipment in Osnaburg Township and was formerly worked on this scale in the Nimishillen Valley, south of Canton, where the bed ranges from 2 to 3 feet in thickness and is divided into two benches by a clay or shale parting about 2 inches thick, as shown in figure 17, B, which is a section of this bed measured in Nimishillen Township. The area of Middle

Tuscarawas County.—Tuscarawas County, one of the large coal-producing counties of Ohio, derives probably 90 per cent of its fuel from the Middle Kittanning bed. The mines, which are not evenly distributed, are grouped in four districts—Valley Junction, east of New Philadelphia, south of New Philadelphia, and Uhrichsville. However, the Middle Kittanning coal bed is not restricted to these districts, but is found in every township in the county and has

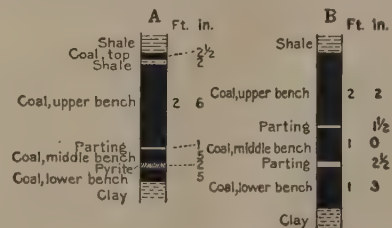


FIGURE 19.—Sections of Middle Kittanning (No. 6) coal bed in Tuscarawas County, Ohio. A, Auburn Township; B, Goshen Township.

been mined in all except Perry. In the northwestern part of the county, however, it lies so near the hilltops that its area is small. Moreover, it is thin in that region, generally not exceeding 3 feet; whereas in those parts where it is most extensively mined it is 3 feet 6 inches to 5 feet thick, and, according to Orton, is of superior quality. The coal, which in Stark County consists of two benches, consists of three in most places in Tuscarawas County. The character of the Middle Kittanning coal bed in this county is represented by figures 18 and 19.

Section of Middle Kittanning coal from Medville & Goshen Coal Co.'s mine, Warwick Township, Tuscarawas County, Ohio.

	Ft. in.
Shale.....	9
Coal, bony.....	1 9
Parting.....	$\frac{1}{2}$
Coal, middle bench.....	7
Parting.....	$2\frac{1}{2}$
Coal, lower bench.....	1 8
Clay.....	5 0

A sample obtained in this mine, upon analysis, shows moisture 4.1, volatile matter 41.6, fixed carbon 49.1, and ash 5.2 per cent. Its ultimate analysis shows carbon 72.45, hydrogen 5.57, oxygen 12.10, nitrogen 1.42, sulphur 3.25, and ash 5.21 per cent. The heat value is 13,200 B. t. u. An average of 16 samples from various parts of the county shows thickness 3 feet 7 inches, ash 7.3, moisture 4.3, sulphur 3.85 per cent, and heat value 12,800 B. t. u.

The Middle Kittanning coal in Tuscarawas County has moderate strength and is suitable for domestic use, but its great market is for steam production. The quantity of the coal is large, and the county will be an important source of fuel for many years.

Coshocton County.—Coshocton County, which lies southwest of Tuscarawas, contains a large

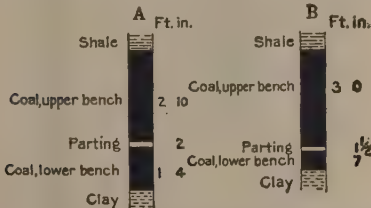


FIGURE 20.—Sections of Middle Kittanning (No. 6) coal bed in Coshocton County, Ohio. A, Franklin Township; B, Virginia Township.

area of the Middle Kittanning coal in the southeastern part. The coal is extensively worked for railroad shipment near Muskingum River below Coshocton and southeast of that town in Lafayette Township. The coal in the southern part of the county consists generally of two benches with a parting near the bottom ranging from 1 inch to 2 inches in thickness, as shown in figure 20, A and B, and figure 21, A. In the northern part of the county it is in places free from partings, as shown in figure 21, B.

An average of 11 samples from various parts of the county shows thickness 3 feet 2 inches, ash 6.8, moisture 5.5, sulphur 3.82, and heat value 12,560 B. t. u. These figures show that the coal is similar to that of the same bed in Tuscarawas County. Incidentally, the coal is used for the same purposes.

Guernsey County.—The coal is mined for railroad shipment in the northwest corner of

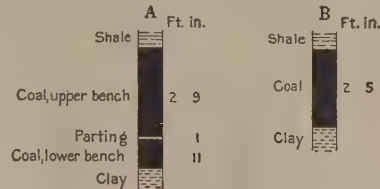


FIGURE 21.—Sections of Middle Kittanning (No. 6) coal bed in Guernsey County, Ohio. A, Jackson Township; B, Clark Township.

Guernsey County and also a short distance north of the county seat, Cambridge.

Muskingum County.—The Middle Kittanning coal underlies nearly the whole of Muskingum County east of Muskingum River and parts of Harrison, Brush Creek, Newton, and Perry townships west of the river. Its area is therefore large. However, it passes below drainage in Rich Hill, Union, and southern Highland townships, and very little is known of it in that territory. It is mined for local use in every township where it should appear above drainage and for railroad shipment on the west side of Muskingum River.

Orton says:

The seam falls short of 3 feet in parts of the field, and it nowhere yields fully 4 feet of coal, but it holds, with surprising steadiness, a measure ranging from 30 to 42 inches of coal. Its structure, too, is maintained with great regularity over large areas.

The coal bed, as shown by the following section, consists of two benches separated by a thin layer of shale or clay:

Section of Middle Kittanning coal bed in Birkheimer mine, Madison Township, northern Muskingum County, Ohio.

	[See fig. 22, A.]	Ft. in.
Shale.....		
Coal, upper bench.....		2 1
Parting.....		$1\frac{1}{2}$
Coal, lower bench.....		7
Clay.....		2 9½

Section of Middle Kittanning coal bed in Walnut Hill Coal Co.'s mine, sec. 13, Brush Creek Township, Muskingum County, Ohio.

	Ft.	in.
Shale.....	20	0
Coal, upper bench.....	1	7
Parting.....		$\frac{1}{2}$
Coal, lower bench.....	2	0
Clay.....	23	$7\frac{1}{2}$

A sample obtained in this mine gave, in proximate analysis, moisture 5.1, volatile matter 39.7, fixed carbon 45.4, and ash 9.8 per cent;

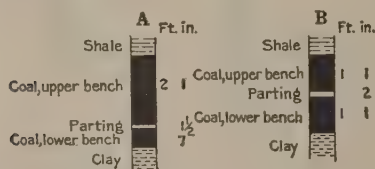


FIGURE 22.—Sections of Middle Kittanning (No. 6) coal bed in Muskingum County, Ohio. A, Madison Township; B, Harrison Township.

and in ultimate analysis carbon 65.74, hydrogen 5.32, oxygen 12.49, nitrogen 1.14, sulphur 5.54, and ash 9.77 per cent. The heat value is 12,240 B. t. u. Figure 22, B, shows the character of the bed in Harrison Township.

Perry County.—The Middle Kittanning coal is found wherever due in the eastern half of Perry County, and in normal structure and thickness except in the southern tier of townships, where it thickens and forms part of the Hocking Valley coal field. The structure and thickness of the bed in the northern part of the county are shown in figure 23, A, and in the central part in figure 23, B. North of these southern townships its area is large and its thickness, structure, and quality are similar to those prevailing in Muskingum County. Throughout this area the coal is extensively mined for railroad shipment as well as for local use.

The thickness and quality of the coal between Muskingum River and the Hocking Valley field are well shown in the following average of 10 measurements and samples: Thickness 3 feet 4 inches, ash 8.4, moisture 5.9, sulphur 3.72 per cent, and heat value 12,310 B. t. u.

Hocking Valley field.—The Hocking Valley coal field, as outlined by Orton, consisted of those parts of Perry, Hocking, and Athens counties where the Middle Kittanning bed is 5 feet or more in thickness. This includes parts of Coal, Salt Lick, and Monroe townships,

Perry County; parts of Ward, Green, and Starr townships, Hocking County; and parts of Trimble, Dover, York, Waterloo, Athens, and Canaan townships, Athens County. Orton computed the area of the field at about 94,000 acres. Recent drilling by F. A. Ray has brought to light much additional information regarding this coal bed and has materially changed Orton's southern limit, which is now placed approximately 2 miles south of Athens and 1 mile south of New Marshfield and Mineral, and his western limit, which is now placed near the outcrop of the coal. It must not be understood, however, that within these boundaries the coal everywhere equals or approaches 5 feet in thickness, for in many places it is less and in large areas it is cut out entirely. The greatest change is along the eastern border, which is marked by the "faulted" or barren area that in the main lies just east of the valley of Sunday Creek. The map (Pl. III) by F. A. Ray shows for the first time the Jumbo "fault," which is not a fault at all in the technical sense but an area where the coal is cut out by sandstone or other rock. The cutting appears to have been the work of streams whose current

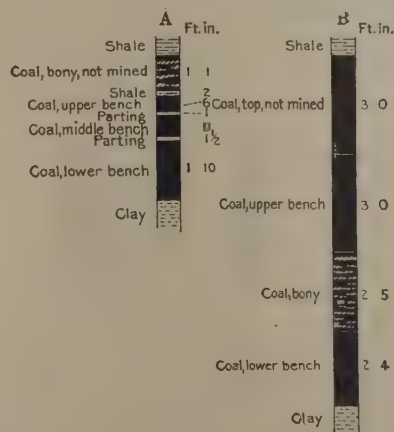


FIGURE 23.—Sections of Middle Kittanning (No. 6) coal bed in Perry County, Ohio. A, Harrison Township; B, Pike Township.

swept away the accumulated vegetal material and deposited in its place sand or mud. Lack of definite knowledge as to the location and extent of this "fault" has caused heavy financial losses to mining companies.

The coal comes in again just east of the fault in Homer, Union, and Marion townships, but it is thin in this area, which is not generally regarded as a part of the Hocking Valley field.



MAP OF THE HOCKING VALLEY COAL FIELD (MIDDLE KITTANNING OR NO. 6 COAL BED), SOUTHEASTERN OHIO
By F. A. Ray

Broken line in Homer, Union, and Monroe townships marks eastern limit of "faulted" area; coal bed east of that line is thin and not generally regarded as a part of the Hocking Valley field

Section showing relations of Middle Kittanning coal to strata above and below, in Hocking Valley coal field, Ohio.

	Ft.
Limestone, Cambridge.....	1
Shale.....	29
Brush Creek shale member:	
Limestone.....	2
Shale.....	16
Limestone.....	1
Sandstone, shaly.....	30
Coal, Mahoning, thin.....	
Clay and shale.....	4
Sandstone, Mahoning.....	35
Coal, Upper Freeport.....	3
Clay, Upper Freeport.....	5
Limestone (Upper Freeport), ore, sandstone, and shale.....	45
Coal, Lower Freeport.....	2
Clay, limestone (Lower Freeport), and sandstone (Freeport).....	25
Coal, Middle Kittanning.....	5
Clay, shale, and ore.....	30
Coal, Lower Kittanning.....	2
Clay and shale.....	15
Limestone, Vanport ("Feriferous").....	
	250

Concerning the structure of the coal bed in this field Orton says:

In structure, the Hocking Valley coal always has the three benches of the normal Middle Kittanning seam, with

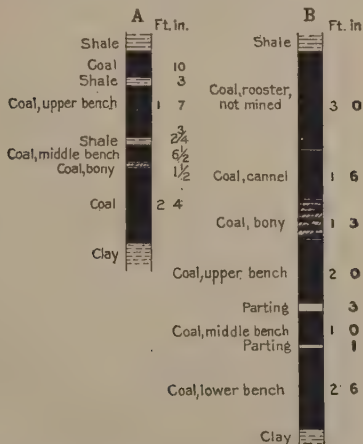


FIGURE 24.—Sections of Middle Kittanning (No. 6) coal bed in Athens County, Ohio. A, Canaanville; B, Trimble Township.

some addition of its own. In other words, the Great vein consists of the normal, three-bench seam of Middle Kittanning age, covered and reinforced by a Hocking Valley supplementary seam, the latter consisting of one or two or more benches. The supplementary seam is separated from the original seam by a thin shale parting, which is often disregarded in mining, but which is for the most part distinctly recognizable when looked for.

This "supplementary seam" is known among engineers and miners as the roof or "Rooster" coal. Early efforts in the northern part of the field to market it were failures but later trials were more successful. The coal is very high in ash, but is said to have good heating value and to be easily ignited. Moreover it stands transportation unusually well, and this and its

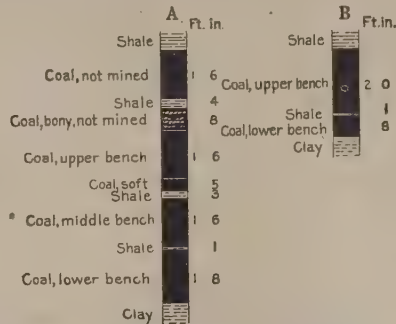


FIGURE 25.—Sections of Middle Kittanning (No. 6) coal bed in Athens County, Ohio. A, Dover Township; B, Waterloo Township.

ease of ignition has secured for it a market for domestic purposes in the Northwest. However, this part of the bed has never been successfully mined except in the vicinity of Corning, Rendville, Congo, Shawnee, and New Straitsville, all in the northern part of the Hocking Valley field. Farther south the "supplementary seam" has more shale and can not be marketed. The coal bed as a whole is thickest in southern Perry County, where it measures locally as much as 15 feet.

The character and thickness of the Middle Kittanning coal bed in Athens County is shown in figures 24 and 25 and by the following sections. The first is from the Sunday Creek Valley and the second from the western side of the field.

Section of Middle Kittanning coal bed in mine of Continental Coal Co., sec. 8, Trimble Township, Athens County, Ohio.

	Ft. in.
Shale.....	
Coal, supplementary bench, rejected.....	4 6
Coal, bony.....	1 3
Coal, upper bench.....	2 0
Shale parting.....	3
Coal, middle bench.....	1 0
Shale parting.....	1
Coal, lower bench.....	2 6
Clay.....	
	11 7

The proximate analysis of a sample from this mine shows moisture 7.3, volatile matter 32.4, fixed carbon 53.6, and ash 6.7 per cent; the ultimate analysis shows carbon 69.46, hydrogen 5.45, oxygen 16.16, nitrogen 1.34, sulphur 0.86, and ash 6.73 per cent. The heat value is 12,410 B. t. u.

Section of Middle Kittanning coal bed in mine of Continental Coal Co., sec. 4 or 5, Ward Township, Hocking County, Ohio.

Shale:	Ft. in.
Coal, supplementary bench, rejected.....	2 0
Parting.....	3
Coal, top bench.....	3 0
Parting.....	5
Coal, middle bench.....	1 5
Parting.....	1
Coal, lower bench.....	2 1
Clay.	9 3

A proximate analysis of a sample from this mine shows moisture 7.6, volatile matter 34.0, fixed carbon 52.6, and ash 5.8 per cent; and an ultimate analysis shows carbon 70.05, hydrogen 5.52, oxygen 16.39, nitrogen 1.42, sulphur 0.77, and ash 5.85 per cent. The heat value is 12,510 B. t. u. The character of the coal bed in Hocking County is shown in figure 26, A.

The composition of the coal is shown by the following average of 8 analyses of samples from various parts of the Hocking Valley field to be ash 6.2, moisture 7.3, and sulphur 1.22 per cent. The heating value is 12,500 B. t. u.

These figures show but little difference in composition from that of the coal in Coshocton, Tuscarawas, Muskingum, and northern Perry counties, and in fact regularity in composition is one of the characteristics of the bed. The coal of the Hocking Valley field is open burning, low in sulphur, and moderate in ash. It was formerly used in the raw state in making pig iron, but that practice was long ago discontinued. The fuel has had a large sale for domestic purposes, but the great demand has always been for steam production. The coal is fairly hard and tough and so stands transportation relatively well. This quality has won for it a good market in the Northwest.

In early days coal was shipped north from this field by canal, but the quantity was relatively small. In 1869 the Hocking Valley Railway was completed to Columbus and in 1880 the Toledo & Ohio Central Railway.

These lines gave a good outlet to Columbus, where connections were made with other roads. When, a few years later, these lines were extended to Toledo the market was greatly expanded and the Hocking Valley field became one of the largest producers in this country. The figures below show the production of Perry, Hocking, and Athens counties, and that of the Hocking Valley field would not be notably smaller.

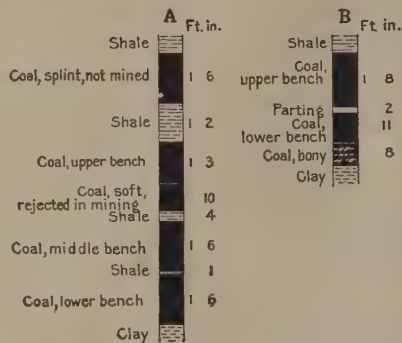


FIGURE 26.—Sections of Middle Kittanning (No. 6) coal bed in Ohio. A, Ward Township, Hocking County; B, Swan Township, Vinton County.

Coal production for certain years of Perry, Hocking, and Athens counties, in short tons.

1883.....	3, 439, 873
1890.....	4, 446, 299
1900.....	7, 166, 916
1913.....	8, 824, 820
1914.....	5, 716, 203
1915.....	4, 921, 493

The zenith of the field's prosperity has been passed, though it will be a large producer for perhaps another half century. Within the last 15 years extensive efforts with the drill have been made to find new areas of coal under cover to the east and south, but the results have not been wholly successful. The best area discovered by this work is at Canaanville, 6 miles east of Athens, where the coal, found at a depth of 412 feet, is about 5 feet thick and has the normal structure and composition of the bed in the Hocking Valley field. It appears to be a lens-shaped block of coal and not a continuous bed, and other areas that have been discovered thus far also seem to lack continuity.

The Middle Kittanning coal extends southwest from the Hocking Valley field and is mined for railroad shipment in the triangle formed by Hocking River on the north, the

Baltimore & Ohio Railroad on the south, and the western boundary of Athens County. In places in the northern part of this area the coal bed has the same thickness and structure that it has in the Hocking Valley field, but elsewhere it is thinner and has only two or three benches. In other words, the "supplementary" bench is not present.

Vinton County.—The Middle Kittanning coal underlies a large part of the eastern half of Vinton County and has been mined for railroad shipment at widely different points, Moonville near the Athens County line, Zaleski, and north of McArthur. The thickness and structure of the bed in this county are well shown in the following sections:

Section of Middle Kittanning coal bed at Moonville, Ohio.

	Ft. in.
Coal, bony.	4
Clay.....	2 4
Coal.....	2
Shale or clay.....	5
Coal.....	3 3

Section of Middle Kittanning coal bed in Cherry mine, sec. 3, Swan Township, Vinton County, Ohio.

[See fig. 26, B.]

	Ft. in.
Shale.	1 8
Coal, upper bench.....	2
Parting.....	11
Coal, lower bench.....	8
Coal, bony.....	3 5

A proximate analysis of a sample of coal from this mine shows moisture 4.9, volatile matter 39.2, fixed carbon 45.8, and ash 10.1 per cent; an ultimate analysis shows carbon 66.26, hydrogen 5.40, oxygen 12.71, nitrogen 1.23, sulphur 4.25, and ash 10.15 per cent. The heat value is 12,320 B. t. u. Although the heat value of this coal is fairly good, its percentages of ash and sulphur are high.

Section of Middle Kittanning coal bed on the Baltimore & Ohio Railroad at Zaleski, Ohio.

	Ft. in.
Shale.	1 5
Coal, top bench.....	4
Parting.....	1 8
Coal, middle bench.....	1
Parting.....	2
Coal, lower bench.....	3 8

The coal is thin in the southern part of Vinton County and is not mined for shipment, but near Hamden it is worked for burning brick.

Jackson, Gallia, and Lawrence counties.—The Middle Kittanning coal is found well up in the hills in the eastern tier of townships in Jackson County, where it usually ranges from 18 to 24 inches in thickness. It crosses Greenfield Township of Gallia County, where it has the character shown in figure 27, A. It can be readily traced across Lawrence County, though it is too thin to be of much value. It outcrops along Symmes Creek and its western tributaries, but it exceeds 2 feet 6 inches in thickness in few places. It has long been mined for local use at Sheridan on Ohio River, where it measures 2 feet 10 inches to 4 feet and is without partings. A section of the coal bed in this locality is shown in figure 27, B. Above this bed, forming the roof, are a few inches of shale

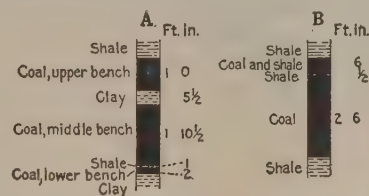


FIGURE 27.—Sections of Middle Kittanning (No. 6) coal bed in Gallia and Lawrence counties, Ohio. A, Greenfield Township; B, Perry Township.

and coal. An analysis of a sample from this place shows 10.9 per cent ash, 3.32 per cent sulphur, and a heating value of 11,930 B. t. u.

LOWER FREEPORT (NO. 6a) COAL BED.

The Lower Freeport (No. 6a) coal is of little value in Ohio and is worked in a fairly large way only at Steubenville. The coal as a rule lies 30 to 60 feet above the Middle Kittanning bed, whose prominence makes identification easy.

The Lower Freeport bed was once mined near Lisbon and was known locally as the Whan coal. Its thickness was as much as 5 feet, but its area was small. Southeast, toward East Liverpool, the coal is thinner, being 2 feet or less, and in places is represented by shale only. It has been mined in a small way along Yellow Creek, where it is known as the Roger coal, and has in places a thickness in excess of 3 feet. South of the mouth of Yellow Creek the Lower Freeport coal has been opened at many places in the hills facing the Ohio Valley, where its thickness is 30 inches or more.

The Lower Freeport coal is mined in the vicinity of Steubenville under the name Steubenville Shaft coal. The first shaft was sunk in 1855, and the coal was reached at a depth of about 187 feet. Since that time mining has been in progress, but coal is no longer shipped.

Section of Lower Freeport coal bed under Steubenville, Ohio.

	[See fig. 28, A.]	
Shale.	Ft.	in.
Coal.....	3	0
Parting.....		$\frac{1}{2}$
Coal.....		10
Clay.	3	10 $\frac{1}{2}$

Although the bed in places attains a thickness of 5 feet, its usual measurement is about 4 feet. The coal is clean, has a bright luster, mines in small pieces, and cokes. It was formerly used rather extensively for coking, but it could not compete with the famous product from Connellsville, Pa., and most of the ovens fell into decay; only a few are now in use. The coal has had a large use in rolling mills, and the La Belle Iron Works operates a mine for its own supply. It is a good steam fuel and has long had a market in Steubenville for domestic purposes.

The limits of the Steubenville field are not known, but the coal has been reached by shafts as far south as Rush Run, 10 miles below the courthouse. At Brilliant 5 feet of coal were found and at Rush Run 7 feet, but the upper and lower foot is of poor quality and for that reason was left in the mine. The coal bed is irregular in thickness, being in places absent and in other places too thin to work. No mining has been done from this shaft for many years. West of Steubenville the coal is under thick cover and no data at hand as to its thickness or quality. It probably extends north and northwest to Yellow Creek and in that event underlies a large area. The field is worthy of exploration and may prove valuable when better and more available supplies have been exhausted.

The Lower Freeport coal is the basis of an important mining industry in the vicinity of Amsterdam, Jefferson County, and north to Bergholz, being worked by four or five railroad shipping mines. In those at Amsterdam shafts are necessary, but about 3 $\frac{1}{2}$ miles farther northeast the coal rises to the surface along the valley of Yellow Creek. It is undoubtedly the same as the Roger coal of the Ohio Valley.

Core-drill and well-record data show a large area of workable coal in the vicinity of Amsterdam and also eastward and southwestward for miles. There are, however, barren areas, and careful testing will be necessary to prove the extent of the coal.

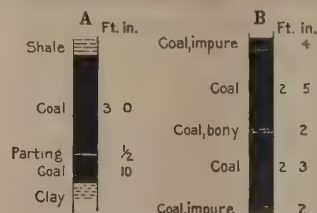


FIGURE 28.—Sections of Lower Freeport (No. 6a) coal bed in Jefferson County, Ohio. A, Steubenville; B, Amsterdam.

The character of the bed in this vicinity is illustrated in figure 28, B, and also by the following sections:

Section of Lower Freeport coal bed in Amsterdam mine, a mile south of Amsterdam, Ohio.

	Ft.	in.
Coal, bony.....	1	2
Coal.....	1	6 $\frac{1}{2}$
Coal, bony.....		3
Coal.....	1	11
Coal, impure.....		5
Shale.	5	3 $\frac{1}{2}$

Section of Lower Freeport coal bed in Elizabeth mine, 2 miles east of Amsterdam, Ohio.

	Ft.	in.
Coal, bony.....		4 $\frac{1}{2}$
Coal.....		6
Coal, bony.....		1
Coal.....	1	7
Coal, bony.....		3 $\frac{1}{2}$
Coal.....	1	9 $\frac{1}{2}$
Shale.	4	7 $\frac{1}{2}$

The average of the two samples from this mine gave, in proximate analysis, moisture 3.4, volatile matter 38.0, fixed carbon 51.6, and ash 7.0 per cent, and in ultimate analysis carbon 73.31, hydrogen 5.40, oxygen 10.15, nitrogen 1.46, sulphur 2.71, and ash 6.97 per cent. The heat value is 13,390 B. t. u.

The Lower Freeport coal can be followed southwest from Columbiana and Jefferson counties to the Hocking Valley, but it attains a thickness of 3 feet in few places and hence is of no value at present. In sec. 9, Clayton Township, Perry County, the bed is 3 feet 3 inches thick and has been mined locally by farmers. Much the same conditions prevail



A. UPPER FREEPORT COAL BED IN CREEK BANK, SALINEVILLE, COLUMBIANA COUNTY, OHIO.



B. SHAFT MINE ON PITTSBURGH COAL BED AT LAFERTY, BELMONT COUNTY, OHIO.

in Pike Township, but it is thicker in the vicinity of Moxahala, Pleasant Township, where it measures as much as 5 feet. However, the bed is irregular in thickness and the coal is high in sulphur. It has been mined at this place and was once used for making pig iron.

The coal attains workable thickness in Vinton County and has been mined in the vicinity of Hamden Furnace, where it measures 3 feet 8 inches. At present, however, it is not mined in either Vinton or Jackson counties except by stripping along streams. The thickness of the bed in these two counties rarely exceeds 20 inches. The coal is found in Lawrence County, where it is known as the Hatcher bed, but it rarely attains 2 feet 6 inches in thickness. At present it is mined in a very small way along Little Ice Creek in the southern part of the county.

UPPER FREEPORT (NO. 7) COAL BED.

General features.—The Upper Freeport (No. 7) is the third most important coal bed in Ohio, the more valuable ones being the Middle Kittanning (No. 6) and the Pittsburgh (No. 8). The relation of this bed to underlying ones is shown in the sections on page 42. The Upper Freeport coal, like the Middle Kittanning, extends across the State from Columbiana County to Lawrence, but it lacks the persistence and regularity of the Middle Kittanning. In places it is well developed and worked on a large scale, but throughout more extensive areas it is thin and of little value. In places the Mahoning sandstone forms the roof, and in some of these it dips down and cuts out the coal in whole or in part. The coal is usually tender and hence does not bear transportation well. Moreover, it weathers rapidly. Nevertheless it is well adapted for steam purposes and has a large market.

Columbiana County.—In Columbiana County the Upper Freeport coal has long been mined at East Palestine, near the Pennsylvania line, where Orton measured the following section:

Section of Upper Freeport coal bed at East Palestine, Ohio.

(See fig. 29, A.)

Sandstone, Mahoning.....	Ft. in.
Shale, black.....	24 0
Coal.....	2 0
Parting.....	2
Coal.....	1 6
Clay.....	2 0
	29 8

The coal bed measures 5 feet in thickness and is mined on a large scale at West Point, about halfway between East Palestine and Salineville. It has the same general structure as that at East Palestine and Salineville, but in places the bench below the parting is high in sulphur and therefore is not worked. At Salineville, another important center of development, the Upper Freeport coal, here known as the "Big vein," has been mined for railroad shipment for more than 50 years. (See Pl. IV; A.)

Section of coal in bank of Yellow Creek at Salineville, Ohio.

Shale.....	Ft. in.
Coal.....	8
Shale.....	4
Coal.....	3 0
Shale.....	1
Coal.....	1 10
Clay.....	5 7½

The upper parting in this section appears to be uncommon, for Orton says that the coal in

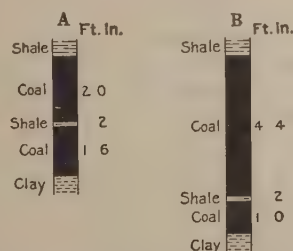


FIGURE 29.—Sections of Upper Freeport (No. 7) coal bed in Columbiana County, Ohio. A, East Palestine; B, Salineville.

the vicinity of Salineville has only one parting and that near the bottom. Orton's section is shown in figure 29, B. From this locality the outcrop of the Upper Freeport coal runs northeast and perhaps connects with that at West Point. About a mile west of Salineville the coal becomes so shaly that it can not be marketed, and it thins rapidly to the east and south.

Many years ago, when slack coal was simply waste, an unsuccessful effort was made to use the slack at this place for the manufacture of coke. Two grades were produced—a soft coke, which yielded 12.1 per cent of ash and 2.73 per cent of sulphur, for domestic purposes, and a harder variety, which gave 17.5 per cent of ash and 3.66 per cent of sulphur.

Carroll County.—Toward the southwest lies the Dellroy or Sherrodsfield in the southwest corner of Carroll County. This field

extends into Monroe Township on the north, nearly to Bowerston on the south, nearly as far as Carrollton on the east, and into Tuscarawas County on the west. A number of mines for railroad shipment have been worked, but all have been abandoned, and the best of the bed is reported to have been worked out. Sherrodsville is said to have had, when mining was at its height, a population of 1,450, but now it has only 350. The coal at its best was 6 feet thick, but it was inconstant, and miners could not count on any definite thickness. The following section by Orton is as representative as a single section can be of an irregular coal bed.

Section of Upper Freeport coal bed at Sherrodsville, Ohio.

	Ft.	in.
Shale, black.	2	10
Coal.....		2
Parting.....	1	2
Coal.....	4	2
Clay.		

The coal is still mined at a number of places for the use of farmers, and the supply is adequate for that purpose for generations.

Tuscarawas County.—The Upper Freeport coal is of some importance in Tuscarawas County. It is now mined for railroad shipment near Midvale and Stillwater, but its area near the latter place is reported to be small.

Guernsey County.—Guernsey County, which lies south of Tuscarawas, forms part of one of the largest coal fields of Ohio. Plate V shows four areas in this county in which the Upper Freeport coal bed is of minable thickness. In the northern part of the county the Upper Freeport coal does not appear to have great value, but it is mined in places by farmers. The principal area of workable coal lies south of Cambridge, as shown on Plate V. In this field the coal bed thickens greatly in a short distance south of Cambridge, and it extends southward to the vicinity of Caldwell, Noble County. Cambridge has always been considered headquarters for this field, and the fuel is known in the market as the Cambridge coal. The western boundary of the field, considering it to be limited to territory in which the coal is 4 feet or more thick, is in the longitude of Cambridge and its eastern boundary in that of Lore City. (See Pl. V.) However, to the east the coal is below drainage, and its

limits can be determined only by the drill. The field is drained by Wills and Leatherwood creeks and most of the mines are on those streams. The coal dips below Leatherwood Creek near the eastern boundary of Cambridge Township and below Wills Creek about one-half mile north of Byesville.

The structure of the bed, as shown by figure 30, is similar to that already reported from Columbiana and Carroll counties. It consists of two benches, with a parting near the bottom. The maximum thickness is 7 feet, but the Mahoning sandstone in places cuts out the

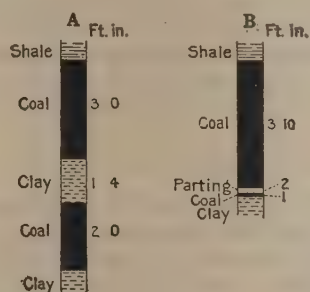


FIGURE 30.—Sections of Upper Freeport (No. 7) coal bed in Guernsey County, Ohio. A, Cambridge Township; B, Center Township.

coal in whole or in part, greatly handicapping the field.

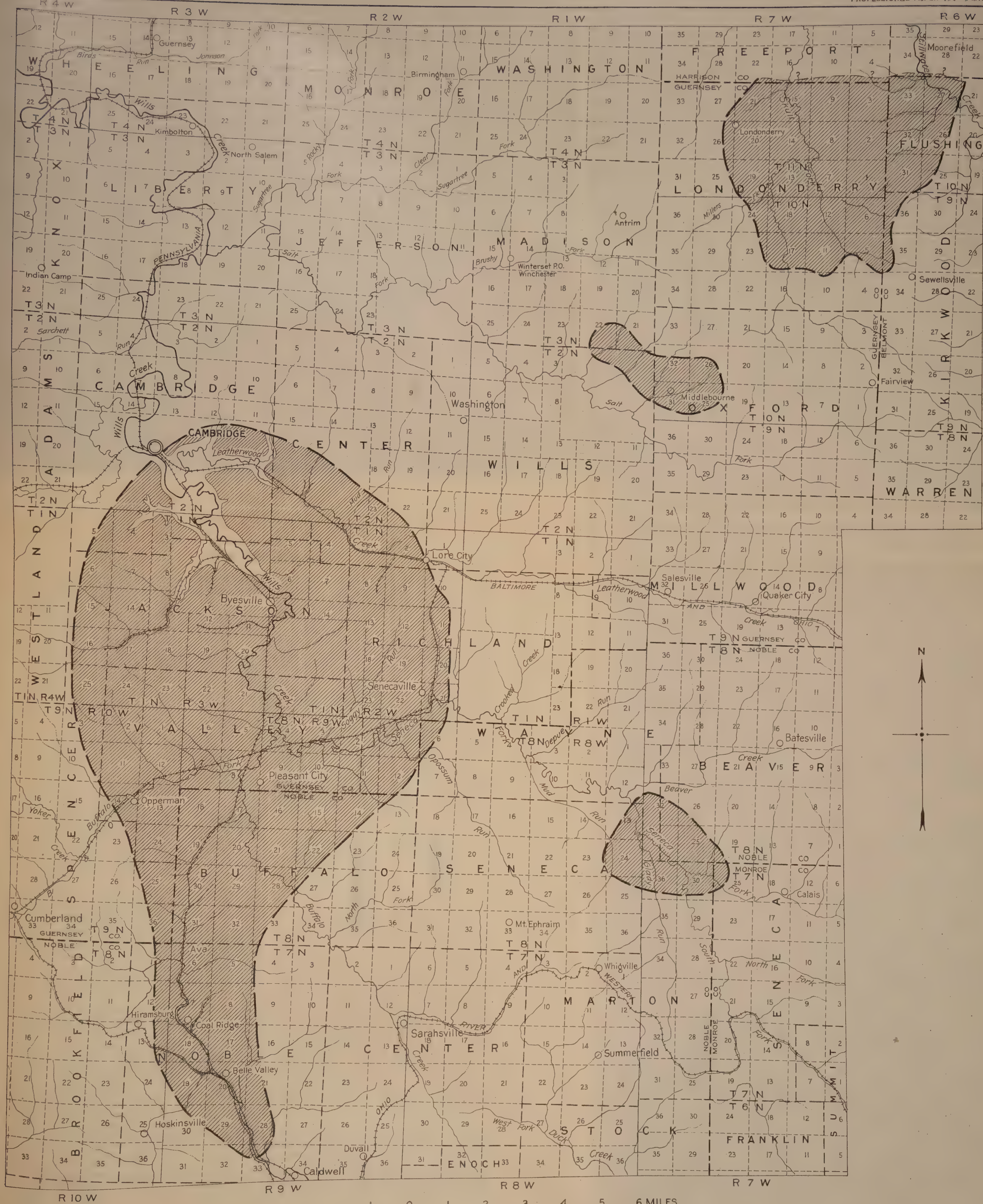
Section of Upper Freeport or Cambridge coal bed in old Nicholson mine near Cambridge, Ohio.

	Ft.	in.
Shale:		
“Draw slate”.....	3	
Coal with numerous shale partings, none persistent.....	4	6
Clay.....	2	
Coal.....	2	4
Clay.	7	3

An analysis of this coal from the Forsythe mine, Danford, Guernsey County,¹ gives volatile matter 38.2, fixed carbon 54.0, ash 7.8, and sulphur 3.79 per cent. The heat value is 13,550 B. t. u.

Although the bed has only one regular parting, it has many thin discontinuous ones in places, and these increase the percentage of ash and sulphur. The coal is tender and does not bear transportation well. Its largest use is in steam production, but it has also a fair market for household use. Under normal industrial conditions about 25 mines

¹ As this analysis is of theoretically dry coal, it should not be compared with other analyses given in this paper.



MAP OF THE CAMBRIDGE COAL FIELD (UPPER FREEPORT OR NO. 7 COAL BED), EASTERN OHIO
By F. A. Ray

Heavy broken lines limit areas of minable coal

are in operation. The field has been worked in a large way for 40 years and has apparently reached, if not passed, its zenith. Extensions during the past few years have been largely to the south, in which direction much prospecting with the drill has been done.

The following figures indicate the production of the Cambridge field in short tons, nearly all of which came from the Upper Freeport bed.

Coal production, in short tons, of the Cambridge field, Guernsey County, Ohio.

1883.....	244,650
1890.....	558,637
1900.....	1,941,373
1913.....	5,109,133

Muskingum County.—The Upper Freeport coal is found in every township east of the river in Muskingum County, but under much of this large area the bed is thin and of little value. It has been worked by farmers at several places, notably in the vicinity of Sonora and Zanesville, where it attains a maximum thickness of 5 feet 6 inches. A section of the bed in Wayne Township, a few miles south of Zanesville, is represented in figure 31, A. It is now mined for railroad shipment on the narrow-gage railroad 5 miles east of Zanesville. Near Blue Rock, on the river in the southern part of the county, the coal was long mined for local trade. The bed is normally 4 feet thick in this field, and the coal is very bright and high in volatile matter.

However, the most valuable area of the Upper Freeport coal in Muskingum County lies in the southwestern part and includes a large part of Brush Creek Township, about one-third of Clay Township, and nearly three sections in Newton Township. It has long been mined by farmers. It has a generally constant thickness of about 4 feet, containing few shale or clay partings.

Section of Upper Freeport coal bed in Maynard Bros. mine, Brush Creek Township, Muskingum County, Ohio.

Shale.....	Ft. in.
Coal, upper bench.....	1 4
Pyrite and shale.....	1½
Coal, lower bench.....	2 7
Clay.....	4 ½

A proximate analysis of a sample from this mine gives moisture 4.7, volatile matter 43.5,

fixed carbon 44.2, and ash 7.6 per cent; and an ultimate analysis gives carbon 68.27, hydrogen 5.55, oxygen 12.30, nitrogen 1.32, sulphur 5, and ash 7.56 per cent. The heat value is 12,680 B. t. u.

Perry County.—From Muskingum County the Upper Freeport coal can be followed southwest into Perry County, where it has long been worked by farmers and is now mined for railroad shipment at Burr Oak, in the southern part of Monroe Township. The coal is at its best, so far as thickness is concerned, in this township, where it has a maximum of 6 feet, with the usual character of the bed and quality of the coal. It is locally known in parts of Perry County as the Norris coal.

Athens County.—South of Monroe Township it is thick in Trimble and Dover townships, Athens County, and has long been mined

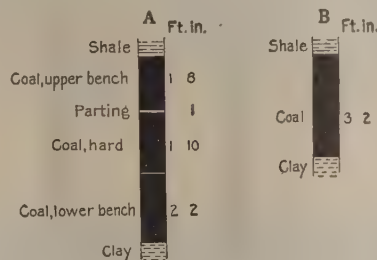


FIGURE 31.—Sections of Upper Freeport (No. 7) coal bed in Ohio. A, Wayne Township, Muskingum County; B, Symmes Township, Lawrence County.

for railroad shipment along the Sunday Creek valley. It is now worked in the large way at Palos, Jacksonville, between Jacksonville and Millfield, and near Millfield.

Section of Upper Freeport coal bed at Jacksonville, in southern Trimble Township, Athens County, Ohio.

Shale.....	Ft. in.
Coal, upper bench.....	2 2
Shale.....	2
Coal, lower bench.....	2 2
Clay.....	4 6

The coal was formerly coked on a small scale near the western border of Dover Township. Only the slack seems to have been used, and it was dirty and high in sulphur. The coke could not be used in high-grade foundry work.

York Township, which lies west of Dover, contains an important area of the Upper Freeport coal, which is mined for railroad shipment

at Buchtel, Doanville, and near Nelsonville. At its best the bed is 6 feet thick but is somewhat dirty, owing to thin shale or clay partings. An analysis shows 8.3 per cent ash. The coal has been mined in a small way in Waterloo and Athens townships in the same county; its area is large, but the coal in Athens Township is reported to be irregular in thickness.

Vinton County.—The Upper Freeport coal is of very little value in Vinton County, the only known workable areas being in Wilkesville Township, where in a very small area in sec. 22 it has a maximum thickness of 6 feet.

Jackson and Lawrence counties.—The Upper Freeport coal is found in the hills along the eastern border of Jackson County, but it is thin and nowhere mined. The bed has long been worked for local use near Rockcamp in the southern part

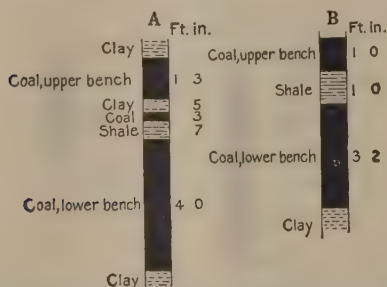


FIGURE 32.—Sections of Upper Freeport (No. 7) coal bed in Lawrence County, Ohio. A, Symmes Township; B, Aid Township.

of Lawrence County, where it has a maximum thickness of 3 feet. It attains importance in Symmes Valley in the eastern part of the county, where it is known as the Waterloo bed. Its thickness there is very irregular and may reach 6 feet, but in places the coal is wanting. The two benches found elsewhere are generally present in this field, but the parting is in many places expanded and may measure a foot or even more. The character of the coal bed in this valley is shown in figure 31, B, and in figure 32, A and B.

COAL BEDS IN THE CONEMAUGH FORMATION.

The Conemaugh formation, formerly known as the "Lower Barren Coal Measures," lies between the Upper Freeport (No. 7) and the Pittsburgh (No. 8) coal beds. The formation outcrops in a broad band 5 to 28 miles in

width stretching from Columbiana County southwestward to Lawrence County at the extreme southern point of the State. It ranges in thickness from 355 feet in southern Ohio to 500 feet in the eastern part of the State.

Generalized section of the Conemaugh formation in Noble and adjoining counties.

[By D. D. Condit.]

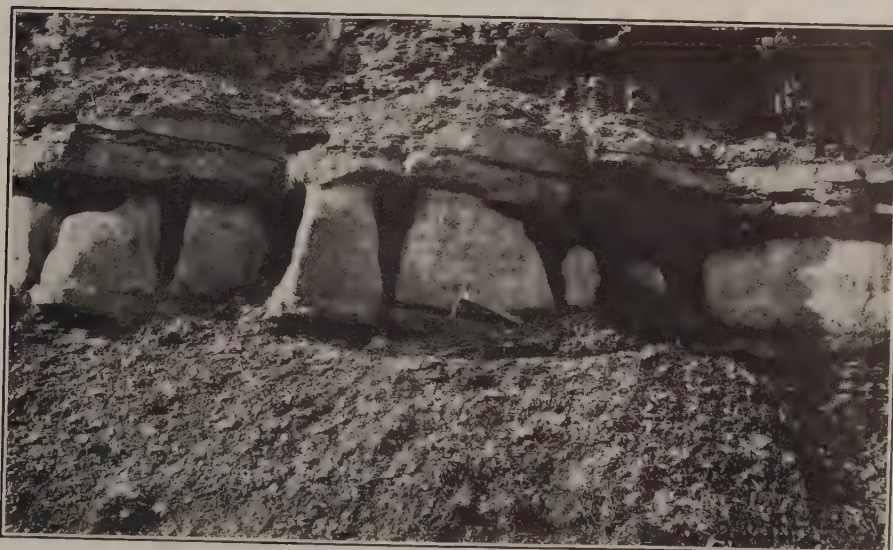
Coal, Pittsburgh, basal member of the Monongahela formation.	Feet.
Limestone and clay	5
Sandstone or sandy shale	21
Limestone in several layers, generally with a lumpy brecciated or pebbly surface; buff color common	8
Shale, with alternating beds of sandstone and clay, commonly reddish brown	120
Shale, sandy, or locally sandstone (Morgantown member)	30
Limestone, Ames or "Crinoidal" member	2
Shale	11
Coal, Harlem, usually thin, workable at Harlem Springs, Carroll County.	
Shale or red clay, locally replaced by sandstone (Saltsburg member)	20
Limestone, nodular or in continuous layers	3
Shale, sandy, with local lentils of massive sandstone (First Cow Run sand of oil drillers)	60
Coal, Anderson (Bakerstown of Pennsylvania and West Virginia); 18 inches to 2 feet thick near Lore City and Pleasant City, Guernsey County, and locally of similar thicknesses to the south and southwest in Noble and Morgan counties. The roof shale is black and contains marine fossils.	
Clay, with nodular limestone	11
Limestone, Cambridge member, dark gray, fossiliferous; varying from nodular to a single continuous layer; well suited for use as road material	4
Shale, locally replaced by a bed of massive sandstone (Buffalo member), especially prominent along Stillwater Creek, in Tuscarawas County	38
Shale, dark, with marine fossils and one or more thin coal beds (Brush Creek member)	20
Sandstone, shaly to massive	20
Clay and shale, with one or more limestone layers	10
Sandstone, shaly	45
Shale and clay, with locally a thin coal (Mahoning member)	10
Sandstone, shaly to massive (Mahoning member)	35
Upper Freeport or Cambridge coal, top member of Allegheny formation.	

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In southern Ohio, according to Condit, the general section is similar to that just given, though the formation is thinner and presents minor variations.



A. QUARRY IN MAHONING SANDSTONE MEMBER NEAR CORNING, PERRY COUNTY, OHIO.



B. BRUSH CREEK LIMESTONE MEMBER OF THE CONEMAUGH FORMATION NEAR DEXTER, MEIGS COUNTY, OHIO.

General section of the Conemaugh formation in Meigs County, Ohio.

Limestone, nodular or in layers, interlain with clay.....	Ft. in.	4	0
Shale, sandy.....	45	0	
Sandstone (Connellsville member), massive to shaly.....	30	0	
Coal, "blossom".....			
Limestone, nodular.....		8	
Shale, sandy, with red beds.....	38	0	
Clay, red, with concretions of hematite.....	28	0	
Shale, sandy.....	12	0	
Limestone (Ames or "Crinoidal" member), impure and sandy in many localities.....	1	6	
Shale, sandy.....	10	0	
Clay shale, red, with nodular limestone ("Round Knob horizon"; "Pittsburgh reds").....	34	0	
Coal, Anderson (Bakerstown), thin.....			
Shale, sandy.....	33	0	
Limestone (Cambridge member), dense, dark gray, fossiliferous; missing in many localities.....	1	6	
Shale, sandy.....	20	0	
Limestone (Brush Creek member), shale, and sandstone, all fossiliferous.....	30	0	
Shale, sandy.....	5	0	
Coal, Mason.....		6	
Sandstone, shaly to massive.....	22	0	
Coal, Mahoning, thin.....			
Clay, with ferruginous limestone at top.....	3	0	
Sandstone (Mahoning member), massive.....	33	0	
Coal, Upper Freeport (No. 7); top member of the Allegheny formation.....			

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The rocks of the Conemaugh formation have been described by Condit to consist

mostly of sandstone, sandy shale, and clay, much of which has a reddish-brown color. Coal beds and limestones are few and thin. All of the beds are characterized by lack of persistence, and vary greatly from place to place as to thickness and appearance. Local erosion planes and unconformities of small magnitude are abundant and occur at all horizons. These hiatuses are shown by conglomerates and truncated strata. Frequently the material of the conglomerates can be traced to some near-by fossiliferous limestone or coal bed. [See Pl. VI, A.]

The lower half of the Conemaugh formation is largely of marine origin and includes a number of fossiliferous beds, the highest of which, lying a little above the middle, marks the final invasion of the sea into the Appalachian Basin. All overlying strata lack forms of undoubted marine origin, their fossils being mostly plant remains and certain minute fossils, such as *Spirorbis*, ostracods, and gastropods, generally regarded as fresh-water, with some fish, amphibian, and reptilian bones. Some insect remains are well preserved in the shale. The marine limestones of the lower half of the for-

mation are the most persistent and lithologically uniform (see Pl. VI, B), but even these have suffered contemporaneous erosion and are locally missing, owing to unfavorable conditions of deposition, such as the presence of shoals in the sea and continuous sedimentation from rivers.¹

The coal beds of the Conemaugh formation are thin and unimportant, though they are worked at places by farmers and at one place for railroad shipment. The Mahoning bed is the lowest of these coals and is rated by Condit as the most important. It is known by several local names, such as Groff in the upper Ohio Valley, Strip at Salineville, and Finley along Island Creek in northern Jefferson County. Its most valuable areas are in Columbiana, Jefferson, and Carroll counties, throughout large parts of which the bed ranges from 2 to 3 feet in thickness. Condit states that this coal is at its best in the vicinity of Salineville, where it measures as much as 38 inches, has a shale parting about 10 inches above the base, and lies only 32 feet above the Upper Freeport or "Big vein." About 2 miles west of Salineville, in the eastern part of Carroll County, this coal is worked for railroad shipment by two companies, and it is the only place in Ohio where a coal in the Conemaugh formation is mined for such shipment. Along Island Creek in northern Jefferson County the Mahoning coal bed is from 3 feet to 4 feet 6 inches in thickness and has long been mined for local use. From what has been said it is apparent that the Mahoning coal is at least of marked local value.

The Mason coal, although persistent, is of little value except in eastern Ohio, where it lies about 75 feet above the Upper Freeport coal. Condit states that it is mined at several places along the Youngstown & Ohio River Railroad in Madison Township, Columbiana County, and is from 3 feet to 3 feet 6 inches thick, but these dimensions do not appear to persist throughout wide areas.

The Wilgus coal bed is 18 to 36 inches thick in parts of Gallia and Lawrence counties in the southern part of the State and is worked for a local supply on many farms, especially in the valley of Symmes Creek. The Cambridge limestone forms its roof.

¹ Condit, D. D., Ohio Geol. Survey, 4th ser., Bull. 17, p. 15, 1912.

The Anderson coal, according to Condit, is workable over much of Muskingum and Morgan counties and in places in Guernsey, Noble, and Harrison counties. In Muskingum County it is reported at its best in Union, Salt Creek, and Blue Rock townships, where its thickness is 2 to 3 feet and its quality is very good. In southwest Harrison County it is 1 foot 6 inches to 3 feet thick, though the 3-foot thickness is not common. It is mined on a few farms. On the property of the Noble Brick Co. at Glenwood station, Noble County, the Anderson coal is 23 inches thick, and it has been opened on many farms along Buffalo Creek in the northern part of this county.

The Barton coal bed, lying about halfway between the Ames and Cambridge limestones, is thin and of small value even locally. In southern Carroll County it is 20 to 24 inches thick and is worked in a few mines. The shale roof is strong and requires little or no timbering. The coal is of good quality.

The Harlem coal, the highest bed of workable thickness in the Conemaugh formation, is at its best in Jefferson, Carroll, and Harrison counties. Harlem Springs, in the southeast part of Carroll County, is its best-known locality and supplies coal to the farmers for miles in all directions. Although the coal does not attain a thickness of 3 feet, it reaches 2 feet 6 inches throughout a broad area.

COAL BEDS IN THE MONONGAHELA FORMATION.

GENERAL FEATURES.

The Monongahela formation, formerly known as the "Upper Productive Coal Measures," outcrops as a broad belt from Jefferson County southwest to Lawrence County and includes parts of Jefferson, Harrison, Belmont, Guernsey, Monroe, Noble, Morgan, Muskingum, Washington, Athens, Meigs, Gallia, and Lawrence counties. The formation has for its basal member the Pittsburgh (No. 8) coal and for its summit the Waynesburg bed. Orton credited the formation with a thickness of 200 feet, and Condit's section differs but little from this. The formation contains three important coal beds, the Pittsburgh, Pomeroy, and Meigs Creek, and two beds of lesser value, the Uniontown and Waynesburg. The relative positions of these are shown in the following section.

Generalized section of the Monongahela formation in Belmont and adjoining counties, Ohio.

[By D. D. Condit.]

	Feet.
Coal, Waynesburg, mined at Somerton, New-castle, and Hunter, Belmont County; high in ash; usually a solid bed with no persistent clay or bone bands.	
Clay and sandy shale.....	18
Coal, thin.	
Clay and buff limestone.....	4
Sandstone, varying from shaly and cross-bedded to massive; quarried west of Miltonsburg, Monroe County.....	50
Coal, Uniontown; mined near Hunter, Belmont County, and along Sunfish Creek, east of Woodsfield, Monroe County; high in ash and usually has several clay bands.	
Clay, with thin layers of nodular limestone.....	10
Sandstone, shaly.....	18
Limestone (Benwood member), numerous beds 1 to 2 feet thick, interlayered with calcareous clay. In the lower portion is a conspicuous bed of olive-green clay.....	72
Coal, Meigs Creek; workable in Belmont County and also over much of Noble, Washington, and other counties to the southwest; rather high in ash but seldom has persistent bands of clay or bony coal.	
Sandstone, varying from shaly to massive and coarse grained.....	35
Coal, Lower Meigs Creek; workable in a few localities near Temperanceville, Belmont County, and southward in Monroe County; contains many bands of impurities and much "sulphur."	
Limestone.....	4
Shale and clay.....	25
Limestone, yellowish.....	3
Sandstone, shaly.....	30
Coal, Pomeroy; thin or wanting.....	
Limestone, laminated, black, underlain by yellowish limestone layers.....	4
Shale, sandy.....	20
Coal, Pittsburgh; present in workable thickness throughout nearly the whole of Belmont County and parts of the surrounding counties.	

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PITTSBURGH (NO. 8) COAL BED.

GENERAL FEATURES.

The Pittsburgh or No. 8 coal is one of the two most important coal beds in Ohio, its only rival being the Middle Kittanning (No. 6) bed, which is more persistent, has a larger acreage, and is of a little better quality. The Pittsburgh coal in Ohio occupies three widely separated fields—the Belmont County field, the Federal Creek field of Morgan and Athens counties, and the Swan Creek field of Gallia County. Outside of these fields the coal is thin and usually worthless.

BELMONT FIELD.

General features.—The Belmont field is by far the largest of the three fields mentioned. It includes nearly the whole of Belmont County, the southern two-fifths of Jefferson County with numerous outliers farther north, the southeastern third of Harrison County, several ridges in the southeastern corner of Guernsey County, the northeastern corner of Noble County, and a somewhat undetermined area in the northern part of Monroe County. (See Pl. VII.)

Ohio River cuts through the coal as far as the southeast corner of Belmont County, where it is said to flow on top of the bed. Several western tributaries, the largest of which are Short Creek, Wheeling Creek, and McMahon Creek, also cut through the coal bed, making it accessible and providing easy routes for railroads. However, throughout a large area in central Belmont County the coal is below drainage and can be reached only by shafting. In Monroe County the coal is everywhere under cover except in the northwest corner, where it has been trenched by the headwaters of Wills Creek.

Throughout this large area the principal structural features of the bed are uniform except along the western border. In the townships fronting on Ohio River the structure is similar to that in the type locality, southwestern Pennsylvania, and is as follows:

Type section of the Pittsburgh coal bed.

- Roof coal.
- "Draw slate" or overclay.
- Breast coal or main bench.
- Clay parting.
- Bearing-in coal.
- Clay parting.
- Brick coal.
- Clay parting, in some places absent.
- Bottom coal.

Along the western border of the field the breast coal thins and in places the bearing-in coal is lacking. In a mine at Temperanceville, Belmont County, the coal bed consists of two benches separated by a shale parting and has a structure similar to that in the Federal Creek and Swan Creek fields. The "draw slate" or overclay commonly ranges in thickness from a few to 18 inches. Above it is the roof coal, which rarely attains a thickness of 2 feet and

is not mined. In many places it is associated with shale and forms the mine roof.

Belmont County.—No other county in Ohio is so favored with coal as Belmont. The hill-tops in the southern half of the county rise to or above the horizon of the Waynesburg coal, which is a local source of fuel on some of the farms. The next lower coal bed is the Uniontown, which is worked at a score or more places in the county and may become a source of fuel of real value when the much more important beds lying below it have been worked out. The Meigs Creek coal, 3 to 4 feet thick, is 100 to 140 feet below the Uniontown and underlies the entire county except along the west border, in the northeast corner, and in narrow strips along a few streams. More important than all these beds combined, however, is the great Pittsburgh coal bed, 3 to 5 feet thick, which underlies the entire county except the northwest corner, where the headwaters of Stillwater Creek have swept the coal away; the valleys of Wheeling and McMahon creeks; a narrow strip along Ohio River; and a few hundred acres in the southwest corner of the county. Throughout this large area the thickness of the bed and quality of the coal, though subject to some variation, are remarkably uniform. The coal is at its best along the Ohio Valley, where it is thicker, a little lower in ash and moisture, and greater in heat value than elsewhere. Along the river front in the northern part of the county the coal is high in the hills, but its dip carries it to the level of the flood plain in the vicinity of Bellaire and to the bed of the river in the southern part of the county.

As it outcrops so prominently the coal must have been known from the time of settlement and was probably mined for household purposes as early as 1825. Shipment by river was started about 1835 and had become an important industry by 1845, the coal going as far as New Orleans. The Baltimore & Ohio Railroad began hauling coal about 1858 from a mine a mile west of Bellaire and from that time to 1900 the output of the field grew steadily; since 1900 the increase has been very rapid. Belmont County is now by far the largest producer in the State; in 1913, before the disastrous strike, it produced more coal than

any other two counties in Ohio. The following figures indicate the growth of the industry:

Production of coal in Belmont County, Ohio, in short tons.

1890.....	774, 110
1895.....	846, 643
1900.....	1, 345, 284
1905.....	3, 957, 980
1910.....	8, 265, 019
1913.....	10, 436, 259
1914.....	2, 849, 181
1915.....	4, 304, 566

The shipping mines, of which there are about 50, are distributed along the river front or the

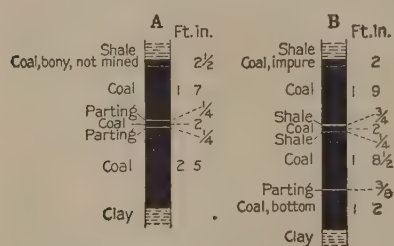


FIGURE 33.—Sections of Pittsburgh (No. 8) coal bed in Belmont County, Ohio. A, Flushing Township; B, Union Township.

Baltimore & Ohio and its branches. As yet the southern two-fifths of this county has hardly been touched and constitutes a fuel body of great value. The coal bed is nearly uniform, but a few sections of it will be given. Figure 33, A and B, shows the coal bed in the northwest corner of the county and figure 34, A and B, in the northeast corner.

Section of Pittsburgh coal bed in Wheeling Valley Coal Co.'s mine at Lafferty, Union Township, Belmont County, Ohio.

[See Pl. IV, B, and fig. 33, B.]

	Ft. in.
"Draw slate".....	1 0
Coal, impure, rejected.....	2
Coal, breast.....	1 9
Parting.....	$\frac{3}{4}$
Coal, bearing-in.....	2
Parting.....	$\frac{1}{4}$
Coal, brick.....	1 8 $\frac{1}{2}$
Parting.....	$\frac{3}{8}$
Coal, bottom.....	1 2
	6 $\frac{1}{2}$

A proximate analysis of a sample from this mine shows moisture 4.5, volatile matter 36, fixed carbon 48.8, and ash 10.7 per cent; an ultimate analysis shows carbon 68.24, hydrogen 4.85, oxygen 10.60, nitrogen 1.10, sulphur 4.45, and ash 10.76 per cent. The heat value is 12,430 B. t. u. The surface plant at this mine is shown in Plate IV, B (p. 56).

The character of the bed in the vicinity of Bellaire is shown by the following section:

Section of Pittsburgh coal bed in Empire Coal Mining Co.'s mine, 1 mile south of Bellaire, Ohio.

	Ft. in.
"Draw slate".....	1 0
Coal, breast.....	2 1
Pyrite.....	$\frac{5}{8}$
Coal, bearing-in.....	3
Shale and pyrite.....	$\frac{1}{2}$
Coal, brick, containing six very thin shale partings.....	1 5
Shale and pyrite.....	1
Coal, bottom.....	10
Shale.....	5 9 $\frac{1}{2}$

The proximate analysis of a sample from this mine shows moisture 3.5, volatile matter 38.6, fixed carbon 51, and ash 6.9 per cent; an ultimate analysis shows carbon 72.06, hydrogen 5.45, oxygen 10.70, nitrogen 1.17, sulphur 3.76, and ash 6.86 per cent. The heat value is 13,190 B. t. u.

This section and analyses may be considered typical of the coal in the dozen or more mines in the vicinity of Bellaire. The coal is well shown along McMahon Creek to a point near Glencoe, where it passes below drainage.

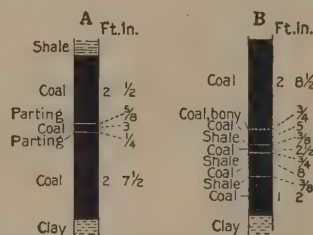


FIGURE 34.—Sections of Pittsburgh (No. 8) coal bed in Belmont County, Ohio. A, Pease Township; B, Colerain Township.

The character of the Pittsburgh coal bed in Mead Township is shown in figure 35, A, and by the following section, which includes the roof coal:

Section of Pittsburgh coal bed in Johnson Bros.' mine near mouth of Pipe Creek, Belmont County, Ohio.

	Ft. in.
Coal, roof.....	1 $\frac{1}{2}$
"Draw slate".....	1 4
Coal, breast.....	2 3
Shale.....	$\frac{1}{2}$
Coal, bearing-in.....	4 $\frac{1}{2}$
Shale.....	$\frac{1}{2}$
Coal, brick and bottom.....	3 2
	7 4



MAP OF THE BELMONT COAL FIELD (PITTSBURGH OR NO. 8 COAL BED), EASTERN OHIO
By D. Dale Condit

A proximate analysis of a sample from this mine shows moisture 2.9, volatile matter 37.9, fixed carbon 51.2, and ash 8.0 per cent; an ultimate analysis shows carbon 72.95, hydrogen 5.11, oxygen 8.59, nitrogen 1.04, sulphur 4.31, and ash 8 per cent. The heat value is 13,210 B. t. u.

The "draw slate" is reported to contract in places to an inch and the breast coal to contain in places thin lenses of pyrite. Partings of "smut" not more than one-fourth inch thick were noted in the lower part of the coal bed. The coal at this place is reported to be on a level with the bed of Ohio River. Three diamond-drill tests, made in secs. 2, 8, and 14, Mead Township, disclosed thicknesses of 5 feet 1 inch,

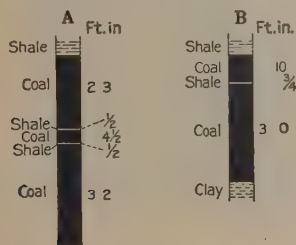


FIGURE 35.—Sections of Pittsburgh (No. 8) coal bed in Belmont County, Ohio. A, Mead Township; B, Somerset Township.

5 feet 5 inches, and 5 feet, respectively, of the Pittsburgh coal bed.

Section of Pittsburgh coal bed in Captina Coal Co.'s mine, Armstrongs Mills, Washington Township, Belmont County, Ohio.

	Ft.	in.
Coal, roof.....	1	0
Coal, bony, rejected.....	3	
Coal, breast, with three thin partings.....	2	8
Shale.....	1	
Coal, bearing-in.....	8	1/2
Coal, brick, with several "smut" layers.....	1	8 1/2
Shale.....	1	1/2
Coal, bottom, with a few pyrite lenses.....	1	1
	7	6 1/2

A proximate analysis of a sample from this mine shows moisture 2.8, volatile matter 37.9, fixed carbon 49.9, and ash 9.4 per cent; an ultimate analysis shows carbon 69.76, hydrogen 5.25, oxygen 9.39, nitrogen 1.09, sulphur 5.09, and ash 9.42 per cent. The heat value is 12,990 B. t. u.

This mine is located in the valley of Captina Creek. As its only outlet is a narrow-gage railroad the output is not large. The coal is below

drainage everywhere on Captina Creek except near the middle of York Township, where a low anticline brings it above the valley floor.

Section of Pittsburgh coal bed in Jefferies mine Temperanceville, Ohio.

[See fig. 35, B.]

	Ft.	in.
Shale.....		
Coal.....	10	
Shale and pyrite.....	2	1/2
Coal.....	3	0
	3	10 1/2

A proximate analysis of a sample from this mine shows moisture 4.1, volatile matter 37.1, fixed carbon 48.2, and ash 10.6 per cent; an ultimate analysis shows carbon 68.77, hydrogen 4.89, oxygen 9.68, nitrogen 1.10, sulphur 4.95, and ash 10.61 per cent. The heat value is 12,480 B. t. u.

Variations in composition of the Pittsburgh coal from east to west across Belmont County are well shown below:

Variations in Pittsburgh coal in Belmont County, Ohio.

	B. t. u.	Ash.	Sulphur.	Moisture.
Eastern border of field, average of 10 samples.....	13,000	8.1	3.74	3.6
Middle field, average of 6 samples.....	12,650	9.0	3.35	4.8
Western border of field, average of 5 samples.....	12,500	9.9	4.02	4.8

In air-dried samples the moisture is about 3 per cent.

The coal cokes, but the coke, because of its sulphur content, can not compete with that from Connellsville or West Virginia. It was formerly coked in the eastern part of Belmont County, but the practice ceased more than 20 years ago. The great use of the coal is for steam and domestic purposes.

Jefferson County.—Jefferson County, which lies north of Belmont, is the second largest producer of coal in Ohio. In 1912 it had an output of 4,858,529 short tons, nearly all of which came from the Pittsburgh bed. As this coal bed rises northward it has been more extensively eroded in Jefferson than in Belmont County, and it is largely restricted to the higher areas. Short Creek, which crosses the field from west to east, and its northwest tributaries have eroded far below the coal bed, and their

valleys are now utilized by railroads. The coal is abundant as far north as the Pennsylvania Railroad, but farther north it is restricted to a few hills and ridges, in only one of which it is of sufficient area to be valuable. The structure and composition of the bed is similar to that in Belmont County.

Section of Pittsburgh coal bed in Wheeling & Lake Erie Coal Mining Co.'s mine No. 2, Dillonvale, Ohio.

[See fig. 36, A.]

Coal, roof.	Ft. in.
Coal.....	2 ½
Shale.....	1 ½
Coal.....	1 6
Shale.....	¾
Coal.....	1 ½
"Draw slate".....	1 0
Coal, breast.....	2 6 ½
Shale.....	¾
Coal, bearing-in:	
Coal.....	1 ½
Parting.....	¾
Coal.....	2 ¼
Shale.....	¾
Coal, brick and bottom.....	2 8
Clay, reported thickness.....	7
	9 3 ¼

The proximate analysis of a sample from this mine shows moisture 3.1, volatile matter 37.9, fixed carbon 49.5, and ash 9.5 per cent; an ultimate analysis shows carbon 69.56, hydrogen 5.22, oxygen 10.77, nitrogen 1.10, sulphur 3.83, and ash 9.52 per cent. The heat value is 12,880 B. t. u.

The mine from which this sample was taken is located in the valley of Short Creek, the most important mining district in the county, and the section given is representative of the coal in that territory. The Ames limestone, of stratigraphic value, lies in the bottom of the valley at Adena, where it is 175 feet below the Pittsburgh coal.

Section of Pittsburgh coal bed in United States Coal Co.'s mine, in extreme northwest corner of Smithfield Township, Jefferson County, Ohio.

[See fig. 36, B.]

	Ft. in.
"Draw slate".....	9
Coal, breast.....	1 11
Parting.....	1
Coal, bearing-in.....	1
Parting.....	¾
Coal, brick and bottom.....	2 2
	5 ¼

A proximate analysis of a sample from this mine shows moisture 4.3, volatile matter 35.3, fixed carbon 52.5, and ash 7.9 per cent; an ultimate analysis shows carbon 71.34, hydrogen 5.18, oxygen 11.39, nitrogen 1.20, sulphur 3.01, and ash 7.88 per cent. The heat value is 12,860 B. t. u.

This mine is near the northern limit of the Pittsburgh coal bed in Jefferson County and

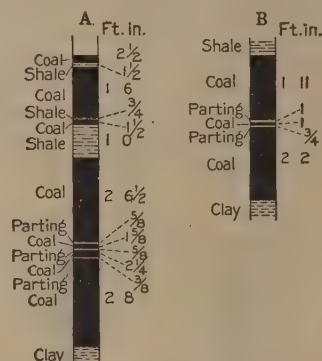


FIGURE 36.—Sections of Pittsburgh (No. 8) coal bed in Jefferson County, Ohio. A, Mount Pleasant Township; B, Smithfield Township.

shows fair thickness and good quality. Although no lenses of pyrite are indicated in the section, they are common in the mine.

Section of Pittsburgh coal bed in Dewland Cox & Sons' mine, Brilliant, Ohio.

	Ft. in.
Coal, breast:	
Coal.....	1 7
Parting.....	¼
Coal.....	1 2
Parting.....	2 ½
Coal, bearing-in.....	2 ½
Parting.....	¼
Coal, brick and bottom.....	2 3 ½
Clay.....	5 6 ½

A proximate analysis of a sample from this mine shows moisture 4.9,¹ volatile matter 33.1, fixed carbon 51.5, and ash 10.5 per cent; an ultimate analysis shows carbon 68.01, hydrogen 5.03, oxygen 11.29, nitrogen 1.12, sulphur 4.09, and ash 10.46 per cent. The heat value is 12,520 B. t. u.

The coal bed, as determined by C. N. Brown with a Y level, is 343 feet above the Wheeling & Lake Erie Railway tracks at Brilliant and

¹ Sample was slightly wet. Moisture may possibly be 1 per cent high on this account.



A. STRIPPING PITTSBURGH COAL IN JEFFERSON COUNTY, OHIO, WITH A STEAM SHOVEL.



B. SAME STRIP PIT AS SHOWN IN A AFTER OVERBURDEN HAS BEEN REMOVED.

238 feet above the Ames limestone. At Brilliant this limestone is 5 feet thick and was formerly burned for lime. It is well shown at many places along the Ohio Valley in the southern part of this county and at Portland lies 197½ feet below the Pittsburgh coal and 75 feet above the railroad tracks.

The Pittsburgh coal is mined by stripping with a steam shovel on the ridge about 2 miles west of Rush Run. (See Pl. VIII, A, B.) On the average about 25 feet of shale overburden is removed. The coal, 5 feet thick, is then shot and loaded on cars with a smaller steam shovel. This bed is stripped at Witch Hazel also, and preparations are under way for work of this kind at two other places in the county.

Harrison County.—The Pittsburgh coal bed underlies the hills and ridges in the eastern half of Harrison County, but its larger areas are restricted to the southeastern townships—Short Creek, Green, Cadiz, and Athens. Everywhere it is high in the hills; even in the southeast corner of the county, where it is lowest, it is approximately 175 feet above the valley. Shipping mines are few and are restricted to two townships. Everywhere the coal bed has the structure characteristic of the Pittsburgh bed in the type locality, and it is everywhere of workable thickness.

Section of Pittsburgh coal bed in mine on S. P. Dunlap farm, northwest corner of Short Creek Township, Harrison County, Ohio.

[See fig. 37, B.]

	Ft.	in.
Coal, roof, reported.....	2	0
"Draw slate," reported thickness.....	1	2
Coal, breast.....	2	1
Parting.....		½
Coal, bearing-in.....	2½	
Parting.....		¾
Coal, brick and bottom.....	1	10½
	7	5½

A proximate analysis of a sample from this mine shows moisture 6.5, volatile matter 35.5, fixed carbon 51.3, and ash 6.7 per cent; an ultimate analysis gives carbon 70.49, hydrogen 5.70, oxygen 13.66, nitrogen 1.22, sulphur 2.19, and ash 6.74 per cent. The heat value is 12,710 B. t. u.

A mine in the northeast part of Short Creek Township shows 4 feet 6 inches of coal with a

heat value of 12,890 B. t. u. Athens Township, which lies west of Short Creek Township, forms the divide between east-flowing and west-flowing streams, and hence has a large area of coal.

Section of Pittsburgh coal bed in mine on John Edwards farm, NE. ¼ sec. 1, Athens Township, Harrison County, Ohio.

	Ft.	in.
Coal, roof.....		10
Clay, "Draw slate".....		10
Coal, breast.....	2	0
Coal, bearing-in (coal and shale).....		2
Coal, brick.....	1	3
Shale.....		½
Coal, bottom.....	1	½
Clay.....	6	1½

A proximate analysis of a sample from this mine shows moisture 6, volatile matter 34.3,

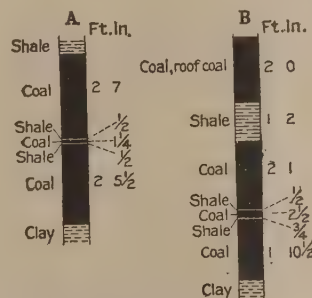


FIGURE 37.—Sections of Pittsburgh (No. 8) coal bed in Ohio. A, Warren Township, Jefferson County; B, Short Creek Township, Harrison County.

fixed carbon 53.7, and ash 6 per cent; an ultimate analysis gives carbon 72.22, hydrogen 5.44, oxygen 13.71, nitrogen 1.31, sulphur 1.35, and ash 5.97 per cent. The heat value is 12,960 B. t. u.

Although this section shows only 4 feet 3½ inches of coal, excluding the roof, the quality is good and the township will become in the near future a large producer. The Meigs Creek coal bed, in good thickness and quality, is also present where due.

Cadiz Township lies north of Athens and has the Pittsburgh coal bed only in the hills and ridges. The coal is worked on several farms, but nowhere for railroad shipment.

Section of Pittsburgh coal bed in Glover Coal Co.'s mine, Cadiz, Ohio.

Shale.		
Coal, breast:	Ft.	in.
Coal.....		7
Pyrite, often wanting.....		$\frac{3}{8}$
Coal.....	1	6
Shale, very thin.		
Coal, bearing-in.....		2
Shale, very thin.		
Coal, brick.....	4	3
Shale.....		$\frac{1}{4}$
Coal, bottom.....	1	1
	4	$7\frac{3}{8}$

A proximate analysis of a sample from this mine shows moisture 3.8, volatile matter 36.7, fixed carbon 48.6, and ash 10.9 per cent; an ultimate analysis gives carbon 67.70, hydrogen 5.09, oxygen 10.68, nitrogen 1.27, sulphur 4.38, and ash 10.88 per cent. The heat value is 12,360 B. t. u.

The coal bed in Green and German townships has the characteristic Pittsburgh structure and is about 4 feet thick. The outlying hills and ridges contain a supply of coal that is valuable for farmers, as railroads are in places miles distant.

Guernsey and Noble counties.—The area of Pittsburgh coal in Guernsey and Noble counties is small and is practically restricted to the two ridges north and south of Leatherwood Creek. In the ridge just north of Quaker City C. N. Brown found the coal bed 190 feet above the Ames limestone and measured the following section:

Section of Pittsburgh coal bed north of Quaker City, Ohio.

	Ft.	in.
Coal, shaly, rejected in mining.....		$3\frac{1}{2}$
Coal, breast.....		10
Shale and pyrite.....		$\frac{3}{4}$
Coal, brick.....	1	8
Clay.....		$\frac{3}{4}$
Coal, bottom.....	1	4
Clay.	4	3

It will be noted that the bed has the characteristic section of the Pittsburgh bed, except that the "bearing-in" coal is represented by a thin layer of shale and pyrite. The "breast" coal, however, is abnormally thin as compared with the type section but has about the thickness that prevails along the extreme western border of the field.

In Noble County the area of Pittsburgh coal of workable thickness is very small and is limited to the northeast quarter of Beaver Township, where in a few places it is mined by farmers.

Muskingum County.—The Pittsburgh coal is found in the high hills in the southeast part of Muskingum County, where in places it attains a thickness of 30 inches and is divided into two parts by a few inches of clay or shale. It can never be a source of fuel except for local purposes.

Monroe County.—The Pittsburgh coal outcrops in the northwest part of Monroe County but appears to be too thin to mine west of sec. 24, Malaga Township.

The coal is known to be present in the southern part of Belmont County and in West Virginia, as far south at least as Proctor, where the bed is nearly 6 feet thick. This indicates that the coal is probably present in the northeastern part of Monroe County, and in fact it has been reported by many oil drillers, and what is more important, by diamond-drill tests.

Thicknesses of coal penetrated by diamond drill in northeastern Monroe County, Ohio.

	Ft.	in.
Sunsbury Township, sec. 35.....	5	0
Switzerland Township, sec. 28.....	5	3
Salem Township, sec. 32.....	5	8

The Pittsburgh coal is probably present in workable thickness north of a line drawn from sec. 24, Malaga Township, through Woodsfield to Proctor on Ohio River, but coal lands in this area should never be purchased without careful exploration with the drill.

AREA BETWEEN BELMONT AND FEDERAL CREEK FIELDS.

The Pittsburgh coal bed between the Belmont and Federal Creek fields is generally less than a foot thick and in places is represented by a black streak only. As already stated, the Belmont field extends into the northeast corner of Noble County, but elsewhere in this county the coal bed is thin and probably worthless. In Meigsville Township, Morgan County, it attains a maximum thickness of 2 feet 6 inches and 18 inches in Bristol and Bloom townships; southwest of Muskingum River it is thinner and is usually represented by nothing more than a black streak, until the

Federal Creek field is reached. In northern Washington County the Pittsburgh coal ranges usually from 2 to 2½ feet in thickness in an area lying mainly in Salem Township (where it is at its best) and in Liberty and Ludlow townships. It is known locally as the Salem or Limestone coal. It has been mined to a very small extent by farmers, but can never be an important source of fuel.

FEDERAL CREEK FIELD.

The Federal Creek field lies in Homer and Marion townships, in the southwest corner of Morgan County, and in Ames, Berne, and Rome townships, in the northeast part of Athens County. Under cover the coal bed extends for an undetermined distance over the line into Washington County. The length of the field above drainage is approximately 15 miles in a northwest-southeast direction, and its average width less than 3 miles. The field is drained by Federal Creek, and the topography is rough. Eastward and westward the coal bed thins abruptly and becomes worthless.

The section of the bed is markedly different from that in the Belmont field. It consists usually of two prominent benches separated by a thick layer of clay. Each bench usually contains one or more shale partings, and the top bench commonly has from a few inches to a foot or even more of bony coal. These characters are well shown in the sections below.

Section of Pittsburgh coal bed in Waymer mine near Joy, Ohio.

[See fig. 38, A.]

	Ft. in.
Coal, upper bench:	
Coal.....	1 6
Coal, bony.....	8
Clay.....	11
Coal, lower bench:	
Coal.....	2
Parting.....	$\frac{1}{8}$
Coal.....	$7\frac{1}{2}$
Parting.....	$\frac{1}{2}$
Coal.....	3
Parting.....	$\frac{3}{8}$
Coal.....	$1\frac{1}{2}$
Parting.....	$\frac{9}{32}$
Coal.....	2 0
	6 4½

A proximate analysis of a sample from this mine shows moisture 6.9, volatile matter 40.5, fixed carbon 44.4, and ash 8.2 per cent; an ultimate analysis shows carbon 67.39, hydrogen

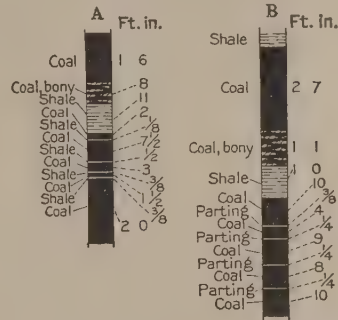


FIGURE 38.—Sections of Pittsburgh (No. 8) coal bed in Ohio. A, Homer Township, Morgan County; B, Berne Township, Athens County.

5.32, oxygen 13.98, nitrogen 0.90, sulphur 4.22, and ash 8.19 per cent. The heat value is 12,100 B. t. u.

Section of Pittsburgh coal bed in Black Diamond Coal & Coke Co.'s mine, Lathrop, Ohio.

[See fig. 38, B.]

Shale.	
Coal, upper bench:	Ft. in.
Coal.....	2 7
Coal, bony.....	1 1
Clay.....	1 0
Coal, lower bench:	
Coal.....	10
Parting.....	$\frac{3}{8}$
Coal.....	4
Parting.....	$\frac{1}{4}$
Coal.....	9
Parting.....	$\frac{1}{4}$
Coal.....	8
Parting.....	$\frac{1}{4}$
Coal.....	10
Clay.....	8 2½

A proximate analysis of a sample from this mine shows moisture 5.8, volatile matter 37.4, fixed carbon 48.8, and ash 8 per cent; an ultimate analysis gives carbon 67.55, hydrogen 5.14, oxygen 14.17, nitrogen 0.95, sulphur 4.19, and ash 8 per cent. The heat value is 12,300 B. t. u.

Section of Pittsburgh coal bed in Federal Coal Co.'s mine, Broadwell, Ohio.

Coal, upper bench:	Ft. in.
Coal.....	1 3
Coal, bony.....	3 1/4
Coal.....	4
Clay.....	1 0
Coal, lower bench:	
Coal.....	6
Parting.....	1/8
Coal.....	2
Parting.....	1/4
Coal.....	2 5
Clay.....	5 11 1/2

A proximate analysis of a sample from this mine shows moisture 6.6, volatile matter 35.1, fixed carbon 48.1, and ash 10.2 per cent; an ultimate analysis gives carbon 66.61, hydrogen 5.13, oxygen 13.72, nitrogen 0.93, sulphur 3.41, and ash 10.20 per cent. The heat value is 11,890 B. t. u.

For comparison with the Pittsburgh coal in other fields, the following percentages, which are the averages of three analyses of samples from different parts of the field, are given: Ash 8.8, sulphur 3.94, moisture 6.4 per cent, and heat value 12,100 B. t. u.; moisture in air-dried samples about 3 per cent.

The Pittsburgh coal in this field is less regular in thickness than it is in the Belmont field, and in places the lower bench alone is present. Both benches, especially the upper, contain boulders of sandstone or sandstone with pyrite which range from pebbles to masses weighing a ton or even more. Their shape is roughly spherical, oval, or flat. The coal has been coked at two places. At Utley 125 ovens were built, but all of these were not in operation at one time and are now in ruins. At Lathrop there were 50 ovens, but these have not been active for many years. The coke is said to have had a ready market, but the industry failed for lack of transportation facilities. During the past few years five shipping mines have been in operation.

The Pittsburgh coal attains workable thickness in Alexander and Lodi townships in the southern part of Athens County and in the adjacent townships, Scipio and Bedford, in Meigs County. In some places the lower bench alone is found, but elsewhere both benches are present. In places the coal reaches 4 feet in thickness, but much more commonly its maximum is 3 feet, and it thickens and thins sharply.

Sandstone boulders in the coal are common. The most that can be said for this field is that it may meet a local demand from farmers. From this area south to Ohio River the Pittsburgh coal bed is generally absent.

SWAN CREEK FIELD.

The Swan Creek field of the Pittsburgh coal lies south of Gallipolis in the eastern part of Gallia County and includes parts of Clay, Ohio, Guyan, Harrison, and Green townships. The north part of the field is drained by Raccoon Creek and its tributaries and the south part by Swan Creek, from which the field is named. The surface is very rough, and the area has no shipping facilities except Ohio River, which has been utilized to a small extent. The section of the bed varies. In Ohio, Clay, and Guyan townships the coal bed usually consists of two benches separated by a bed of

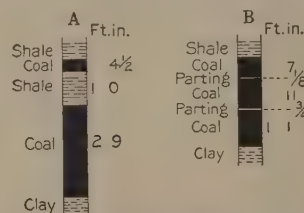


FIGURE 39.—Sections of Pittsburgh (No. 8) coal bed in Gallia County, Ohio. A, Ohio Township; B, Green Township.

shale, which ranges from 8 to 24 inches in thickness. The upper bench is thinner and less constant than it is farther north. This section is strikingly similar to that in the Federal Creek field. In Harrison and Green townships the bed is more complex and the shale parting thinner.

Section of the Pittsburgh coal bed in the Swan Creek Coal Co.'s mine near Bladen, Ohio.

[See fig. 39, A.]

Shale.	Ft. in.
Coal, upper bench.....	4 1/2
Clay.....	1 0
Coal, lower bench.....	2 9
Clay.....	4 1 1/2

A proximate analysis of a sample from this mine shows moisture 5.8, volatile matter 36.7, fixed carbon 47.4, and ash 10.1 per cent; an ultimate analysis gives carbon 64.94, hydrogen 5.16, oxygen 14.40, nitrogen 1.10, sulphur 4.34, and ash 10.06 per cent. The heat value is 11,790 B. t. u.

Section of the Pittsburgh coal bed in the Kerns mine in sec. 27, Harrison Township, Gallia County, Ohio.

Coal, upper bench:	Ft.	in.
Coal.....	2	5
Coal, impure.....	1	
Coal.....	6	
Parting.....	1½	
Coal.....	11½	
Parting:		
Pyrite.....	8	
Coal.....	1	
Pyrite.....	4	
Coal, lower bench:		
Coal.....	8½	
Parting.....	¼	
Coal.....	10	
Clay.....	5	10½

A proximate analysis of a sample from this mine shows moisture 7, volatile matter 36.1, fixed carbon 47.9, and ash 9 per cent; an ultimate

analysis of a sample from this mine shows moisture 7, volatile matter 36.1, fixed carbon 47.9, and ash 9 per cent; an ultimate

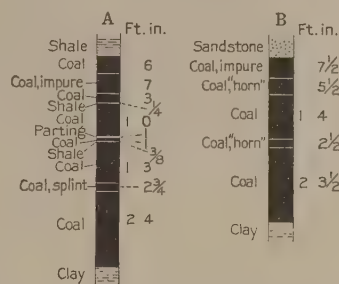


FIGURE 41.—Sections of Pomeroy (No. 8a) coal bed in Meigs County, Ohio. A, Rutland Township; B, Sutton Township.

POMEROY (NO. 8a) COAL BED.

The Pomeroy (No. 8a) coal was long regarded as the Pittsburgh bed. Its true position was not demonstrated until 1908, when work, primarily by Condit, showed it to lie at the horizon of the Redstone bed of Pennsylvania and West Virginia.

The coal bed commonly lies 20 to 55 feet above the Pittsburgh, from which it is separated by a bed of limestone that is more persistent than the Pittsburgh coal itself.

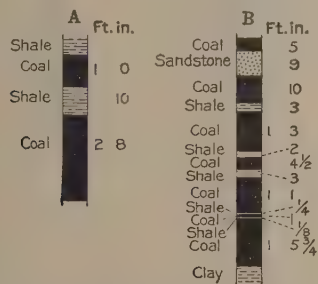


FIGURE 40.—Sections of Pittsburgh (No. 8) coal bed in Gallia County, Ohio. A, Guyan Township; B, Harrison Township.

mate analysis gives carbon 64.91, hydrogen 5.24, oxygen 14.60, nitrogen 1.01, sulphur 5.21, and ash 9.03 per cent. The heat value is 11,860 B. t. u. Another section measured in Harrison Township is shown in figure 40, B; a section in Green Township in figure 39, B; and one in Guyan Township in figure 40, A.

An average of four analyses of samples from this field gives the following composition: Ash 10.5, sulphur 4.45, moisture 6.8 per cent, and heat value 11,720 B. t. u.; moisture in air-dried sample is about 3 per cent.

The best-known and largest producing mine in this field is that of the Swan Creek Coal Co. near Bladen on the bank of Ohio River. It ships the coal on barges and is the only mine in the field to do so. The field is without railroad connections, and this makes large development impossible. For many years coal has been hauled in wagons from the upper end of the field to Gallipolis, which obtains much of

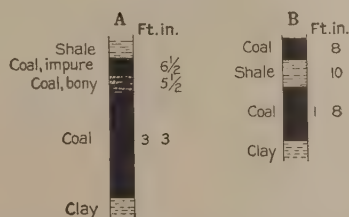


FIGURE 42.—Sections of Pomeroy (No. 8a) coal bed in Gallia and Meigs counties, Ohio. A, Salisbury Township, Gallia County; B, Bedford Township, Meigs County.

The Pomeroy bed is found in the hills opposite Wheeling, W. Va., and can be followed southwest to Lawrence County, but it has little or no value outside of Meigs County. (See Pl. IX.) Its best development is in Salisbury Township (see fig. 42, A) and three or four other townships which border on Ohio River and form the Pomeroy field. The field is thus small but may be extended markedly on the east, where the coal is below drainage. In the northern part of Salisbury Township and in

Bedford Township the bed is less than 2 feet thick, as shown in figure 42, B, but it expands in a short distance to the south and has long been mined on a large scale at Pomeroy. It was early used in the salt furnaces and was later shipped by river and still later by rail.

Although the Pomeroy coal is of workable thickness in Meigs, Gallia, and Lawrence counties, it is thickest in Meigs, in which all the railroad mines, with one exception, are situated. The thickness of the bed and the quality of the coal are shown in figure 41, B, and also in the following section:

Section of Pomeroy coal bed in Logan mine at Pomeroy, Ohio.

	Ft.	in.
Coal, bony.....	1	3
Coal.....	1	8
Parting, very thin.....		
Coal.....		3
Parting, very thin.....		
Coal.....	2	3
Clay.....	5	5

A proximate analysis of a sample from this mine shows moisture 7.2, volatile matter 32.8, fixed carbon 50.7, and ash 9.3 per cent; an ultimate analysis gives carbon 66.47, hydrogen 5.39, oxygen 16.43, nitrogen 1.10, sulphur 1.32, and ash 9.29 per cent. The heat value is 12,000 B. t. u.

Section of Pomeroy coal bed in Maynard Bros.' mine, near Rutland, Ohio.

	Ft.	in.
Shale.....		
Coal, top.....	6	
Coal, impure.....	7	
Coal.....	3	
Parting.....	1	0
Coal.....	1	
Coal.....	1	
Parting.....	3	
Coal.....	1	3
Coal, splint.....	2	4
Coal.....	2	4
Clay.....	6	4

A proximate analysis of a sample from this mine shows moisture 7.6, volatile matter 33.4, fixed carbon 48.1, and ash 10.9 per cent, and an ultimate analysis gives carbon 65.29, hydrogen 5.20, oxygen 15.72, nitrogen 1.03, sulphur 1.83, and ash 10.93 per cent. Its heat value is 11,720 B. t. u. The average of five analyses gives ash 10.4, sulphur 2.46, moisture 6.5 per cent;

heat value 11,950 B. t. u.; the moisture in the air-dried sample is about 4 per cent.

The coal dips below drainage on Ohio River a short distance above Pomeroy. At Syracuse it is 80 feet below the flood plain, and eastward its presence in workable thickness has been demonstrated only by the drill.

Southwest from the Pomeroy field, the coal bed thins and rises in the hills and has been extensively eroded as far as Raccoon Creek in Gallia County. Throughout this area the coal is commonly 2 to 4 feet thick, as shown in figure 43, A, and has been mined in a small way on many farms. South of Raccoon Creek the Pomeroy coal has been less eroded and under-

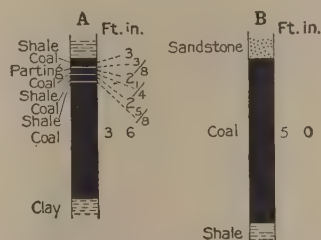


FIGURE 43.—Sections of Pomeroy (No. 8a) coal bed in Ohio. A, Cheshire Township, Gallia County; B, Mason Township, Lawrence County.

lies a large part of the extreme southern area of Gallia County and the adjacent part of Lawrence County. Its western limit is on Greasy Ridge in the eastern part of Lawrence County, where it attains a thickness of 5 feet, as shown in figure 43, B, and is an important source of fuel among the farmers. East of Greasy Ridge the coal attains in places a thickness of 2 feet to 3 feet 6 inches, but throughout most of the territory it is thinner and at present is of no value. Manifestly the Pomeroy coal in its southwest extension can never be more than a source of fuel for the residents of that region.

MEIGS CREEK (NO. 9) COAL BED.

General features.—The Meigs Creek (No. 9) coal, the highest of the important beds in the geologic column of Ohio, was named by C. N. Brown from a stream in Morgan County that drains an area in which this coal bed is well developed. It lies 80 to 100 feet above the Pittsburgh coal and is therefore easily identified. The Sewickley bed of Pennsylvania and West Virginia is its equivalent.

Although the Meigs coal bed is due all the way from Jefferson County southwest to Gallia



MAP OF THE POMEROY COAL FIELD (POMEROY OR NO. 8a COAL BED), SOUTHEASTERN OHIO

By F. A. Ray and D. Dale Condit

County it is of workable thickness in Belmont, Harrison, Monroe, Washington, Noble, and Morgan counties only, and even in these counties it is in places wanting. It has no characteristic structure such as that possessed by the Pittsburgh and Middle Kittanning beds. In places it consists of a solid block of coal, but more commonly it contains one or more clay, shale, or pyrite partings. Both floor and roof are irregular, rising or falling, and thus modifying its thickness. Especially is this true of the roof, which in places cuts out the coal entirely.

Belmont County.—Belmont County, which contains a larger area of this coal bed than any other county in Ohio, is underlain with the bed, except in the northwest corner, where the hills are not high enough; in the southwest part, where the coal has been swept away in the valleys; in the northeast corner, where the coal, though due, is absent; and along Wheeling, McMahon, and Captina creeks, which have cut their valleys below the horizon of this bed. The following section, measured by J. E. Hyde, near Bellaire, shows the Meigs Creek coal bed and its position with reference to other beds below:

Section of Meigs Creek coal bed and underlying rocks, near Bellaire, Ohio.

	Ft.	in.
Shale, gray.....	12	0
Limestone and shale.....	5	6
Shale, gray.....	3	3
Coal, Meigs Creek.....	5	0
Shale and clay.....	1	3
Limestone and shale.....	7	6
Sandstone.....	16	6
Coal.....	4	
Clay.....	5	
Coal.....	1	3
Limestone and shale.....	9	0
Sandstone and shale.....	7	0
Limestone (cement rock).....	6	6
Shale and limestone.....	11	3
Limestone.....	4	0
Shale, gray.....	3	9
Coal, Pomeroy or Redstone.....	1	0
Shale, gray.....	9	
Limestone and calcareous shale.....	10	0
Unseen.....	12	6
Pittsburgh coal.....	118	9

The coal has been mined for railroad shipment for nearly 35 years at Flushing, in northern Belmont County, the only place, except one

or two stations along the narrow-gage road in Noble County, from which the coal is shipped in this way.

Section of Meigs Creek coal bed in Flushing Coal Co.'s mine, Flushing, Ohio.

[See fig. 44, A.]

	Ft.	in.
Clay.....	1	4
Coal.....	3	10
Clay.....	5	2

A proximate analysis of a sample from this mine shows moisture 5, volatile matter 33.3, fixed carbon 48.9, and ash 12.8 per cent; an ultimate analysis shows carbon 66.31, hydrogen 4.95, oxygen 12.32, nitrogen 1.19, sulphur 2.41, and ash 12.82 per cent. Its heat value is 11,970 B. t. u.

The bed is known locally as the "Four-foot" coal, but it does not average that much. Nodules of pyrite are common and have to be

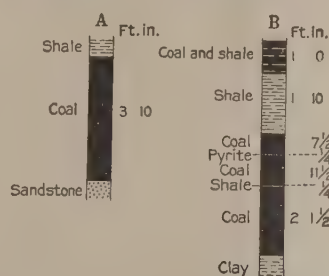


FIGURE 44.—Sections of Meigs Creek (No 9) coal bed in Belmont County, Ohio. A, Flushing; B, Warren Township.

thrown out by the miners. Many farmers in the township have opened mines on their land for a local supply. In Wheeling Township, which lies east of Flushing, the coal bed is similar in thickness and is found where due, but in Colerain Township the bed thins and is of little or no value. Pease Township, forming the northeast corner of the county, is without the Meigs Creek coal bed, though this bed should be present everywhere in the hills. An interesting point is that as the Meigs Creek coal thins the higher beds thicken and become of value as a source of fuel for the farmers.

In an east-west belt, which includes the townships across the middle of the county, the coal bed is usually of workable thickness where it outcrops, but throughout large areas it lies below drainage.

Section of Meigs Creek coal bed in Malden mine, Barnesville, Ohio.

[See fig. 44, B.]

	Ft.	in.
Shale and coal, "roof coal".....	1	0
Shale and clay.....	1	10
Coal.....	7	$\frac{1}{2}$
Pyrite.....		$\frac{1}{4}$
Coal.....	11	$\frac{1}{2}$
Shale.....		$\frac{1}{4}$
Coal.....	2	$1\frac{1}{2}$
	6	7

A proximate analysis of a sample from this mine shows moisture 4.5, volatile matter 35.3,

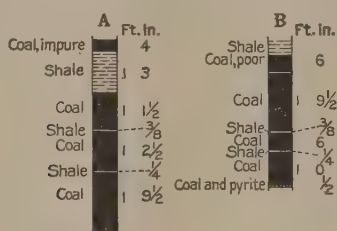


FIGURE 45.—Sections of Meigs Creek (No. 9) coal bed in Belmont County, Ohio. A, Flushing; B, Barnesville.

fixed carbon 47.1, and ash 13.1 per cent; an ultimate analysis shows carbon 65.83, hydrogen 4.99, oxygen 11.71, nitrogen 1.13, sulphur 3.27, and ash 13.07 per cent. Its heat value is 12,010 B. t. u.

The bed in this mine ranges from 3 feet 8 inches to 4 feet 3 inches in thickness and contains thin discontinuous partings of shale or pyrite. The coal has long been mined by farmers as the Upper Barnesville bed. Goshen Township, east of Warren Township, appears to be underlain by the Meigs Creek bed except in two small areas where streams have removed it. A measurement in the Statler mine, in the NE. $\frac{1}{4}$ sec. 36, shows 4 feet of coal whose heat value is 11,840 B. t. u. Union Township, north of Goshen, is almost wholly underlain by the Meigs Creek coal bed. In the Calbert mine, in the SE. $\frac{1}{4}$ sec. 25, the bed is 4 feet 4 inches thick and has a heat value of 12,600 B. t. u. In another mine in this township the section shown in figure 45, A, was measured. The coal is hard and bright but here and there contains streaks of shale or bony coal. The mine supplies the neighborhood farmers and also several mills at Belmont and Bethesda. Richland Township, east of Union, appears to be underlain by the Meigs Creek

coal, except where the bed is cut out along McMahon and Wheeling creeks and their tributaries. The coal has been mined in a small way by several farmers. It shows well in the railroad cut at Glencoe, where it is about 85 feet above the Pittsburgh coal and measures approximately 4 feet in thickness. Another section is shown in figure 46, A. Smith Township, which lies south of Richland, is underlain by Meigs Creek coal except in a very small area in the extreme northeastern corner.

Section of Meigs Creek coal bed in Armstrong's mine, near Glencoe, Ohio.

[See fig. 45, B.]

	Ft.	in.
Shale.....		
Coal, not mined.....		6
Coal.....	1	$9\frac{1}{2}$
Shale.....		$\frac{3}{8}$
Coal.....		6
Shale.....		$\frac{1}{4}$
Coal.....	1	0
Coal and pyrite.....		$\frac{1}{2}$
	3	$10\frac{1}{2}$

A proximate analysis of a sample from this mine shows moisture 3.5, volatile matter 34.8, fixed carbon 49.9, and ash 11.8 per cent; an ultimate analysis shows carbon 67.36, hydrogen 5.02, oxygen 11.06, nitrogen 1.05, sulphur 3.67,

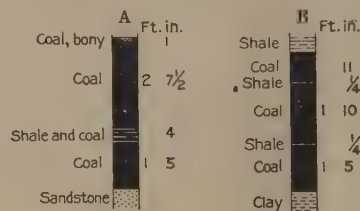


FIGURE 46.—Sections of Meigs Creek (No. 9) coal bed in Ohio. A, Richland Township, Belmont County; B, Athens Township, Harrison County.

and ash 11.84 per cent. The heat value is 12,390 B. t. u.

The floor in this mine is uneven, and hence the thickness of the bed varies considerably. Thin, discontinuous partings of shale and pyrite are common. Pultney Township, which lies east of Richland, fronts on Ohio River and has been deeply trenched by McMahon Creek and its leading tributaries. The local bed has been opened on several farms and in sec. 5 is reported to be 4 feet thick. Mead Township, south of Pultney, is underlain by the Meigs Creek coal bed except along Pipe and

Wegee creeks, where the coal has been removed by erosion.

Section of Meigs Creek coal bed in McMillen mine, NW. ¼ sec. 32, Mead Township, Belmont County, Ohio.

	Ft.	in.
Clay.....	3	0
Coal, not mined.....	4	
Coal.....	4	5
Shale.....	7	9

The southern tier of townships appears to contain the Meigs Creek coal wherever due, but the bed is generally below drainage. In Somerset Township the bed ranges from 2 feet 6 inches to 4 feet in thickness and has been mined to a small extent by farmers. Along Captina Creek in Wayne, Washington, and York townships the coal is above drainage, except from the east part of Wayne to a point near the middle of Washington Township. The coal is said to have been mined in a disconnected way in the vicinity of Armstrongs Mills for more than 60 years and to range in thickness from 2 to 4½ feet. About 1½ miles south of the Belmont County line the coal is said to lie in the bed of Ohio River and to have been mined by stripping during low water.

From the preceding paragraphs it is apparent that the Meigs Creek bed contains a large tonnage of coal in Belmont County. Thus far it has been worked only in a small way, because those who were prepared to operate on a commercial scale have much preferred the thicker and better Pittsburgh bed, which lies only a short distance below.

The Meigs Creek bed, however, may be regarded as a fuel reserve which will be eagerly developed when the Pittsburgh bed is a thing of the past. The coal is of fair quality. Its sulphur content rarely equals 4 per cent and in one analysis made by the Ohio Geological Survey it is less than 2 per cent. The ash is high, reaching in some samples as much as 15 per cent and in few is as low as 10 per cent. The heat value usually ranges between 11,700 and 12,600 B. t. u. The average of seven analyses of samples taken in different parts of the county shows ash 12.2, sulphur 2.99, and moisture 4.6 per cent; the heat value is 12,140 B. t. u. and the moisture in air-dried samples is about 3 per cent.

Harrison County.—The Meigs Creek coal bed is present in only three townships in the south-

east part of Harrison County—Short Creek, Athens, and Cadiz. In Cadiz Township it occurs in so small an area that it may be neglected. In Athens Township the acreage is large and the coal has been made accessible by numerous streams which cut through it.

Section of Meigs Creek coal bed in Joshua Kirk mine, 1 mile west of New Athens, Ohio.

	Ft.	in.
Shale.....		
Coal.....	11	
Parting.....		¼
Coal.....	1	10
Parting.....		¼
Coal.....	1	5
Clay.....	4	2½

[See fig. 46, B.]

A proximate analysis of a sample from this mine shows moisture 5.3, volatile matter 33.1, fixed carbon 51.3, and ash 10.3 per cent; an ultimate analysis gives carbon 68.67, hydrogen 5.21, oxygen 12.38, nitrogen 1.25, sulphur 2.20, and ash 10.29 per cent. The heat value is 12,340 B. t. u.

Section of Meigs Creek coal bed in Culberson mine, south of New Athens, Ohio.

	Ft.	in.
Shale and impure coal.....	2½	0
Clay.....	1	8
Coal, bony, rejected in mining.....	2	
Coal, top.....	2	11
Shale.....		¼
Coal, bottom.....	1	4
Clay.....	2	0
	10	1½

An average thickness of 4 feet 6 inches is claimed for the coal bed in this mine. Nodules of pyrite are common and are sorted out by the miners. This coal has been mined on many farms for local use.

The Meigs Creek coal bed underlies practically all of the southern half of Short Creek Township and, as the Pittsburgh coal is below drainage, is an important source of fuel for the farmers.

Section of Meigs Creek coal bed on Lodge farm, in sec. 16, Short Creek Township, Harrison County, Ohio.

	Ft.	in.
Shale.....	3	0
Coal.....	2	9
Shale, in places absent.....		
Coal.....	1	3
	7	0

Noble County.—The Meigs Creek coal is found in Noble County in every township except Buffalo. East of Duck Creek, which crosses the coal field from north to south, the bed has been largely removed by tributaries to that stream and the coal underlies only the ridges. West of Duck Creek the coal underlies broader areas. It was formerly worked for shipment on the narrow-gage road, a few miles west of Summerfield, and it has been opened at many places by farmers in every township where the coal is present. As the county is not well supplied with shipping facilities, the local supply of coal is at present not valuable. In due time it will doubtless be extensively mined for shipment.

As stated, the Meigs Creek coal east of Duck Creek is limited to the divides between streams. In Marion Township the hills rise well above the coal, but the bed is uncertain and in places is not of workable thickness.

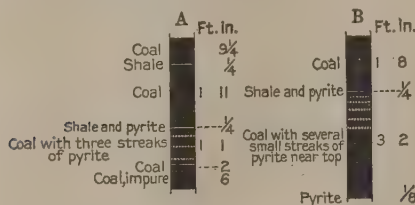


FIGURE 47.—Sections of Meigs Creek (No. 9) coal bed in Noble County, Ohio. A, Marion Township; B, Elk Township.

Section of Meigs Creek coal bed in mine on Hague farm, SW. 1/4 sec. 12, Marion Township, Noble County, Ohio.

[See fig. 47, A.]

	Ft.	in.
Coal.....	9	1/4
Shale.....		1/4
Coal.....	1	11
Shale and pyrite.....		1/4
Coal, with three pyrite streaks.....	1	1
Coal.....		2
Coal, impure, not mined.....	6	
	4	5 1/4

A proximate analysis of a sample from this mine shows moisture 3.1, volatile matter 37.4, fixed carbon 46.7, and ash 12.8 per cent; an ultimate analysis gives carbon 65.61, hydrogen 5.09, oxygen 9.93, nitrogen 0.92, sulphur 5.60, and ash 12.85 per cent. The heat value is 12,130 B. t. u.

Stock Township, south of Marion, has considerable coal, though extensively trenched by a branch of Duck Creek. The thickness

of the bed may average 4 feet with a maximum of 5 feet, but it usually includes several discontinuous shale or pyrite layers. One test of the coal gave 12,510 B. t. u. Elk Township, south of Stock, is an important mining center for an area without a railroad. The mines are in the northeast corner of the township, near the village of Stafford, and the coal is hauled long distances by the farmers.

Section of Meigs Creek coal bed in mine on G. W. Love farm on Shaler Run in Elk Township, Noble County, Ohio.

[See fig. 47, B.]

	Ft.	in.
Coal.....	1	8
Shale and pyrite.....		1/4
Coal with "smut" bands near top.....	3	2
Pyrite.....		1/8
	4	10 3/4

A proximate analysis of a sample from this mine shows moisture 3.1, volatile matter 38.4, fixed carbon 46.2, and ash 12.3 per cent; an ultimate analysis shows carbon 66.18, hydrogen 5.11, oxygen 9.52, nitrogen 0.86, sulphur 6.00, and ash 12.33 per cent. The heat value is 12,360 B. t. u.

The roof of the coal in this township varies much, and in places numerous "rolls" or "horses" of clay with nodules of pyrite partly or entirely cut out the coal. Most of these breaks are 10 to 12 inches wide and have steep or vertical walls, as if the material had been deposited in canyon-like trenches cut in the coal.

Jefferson Township, which lies west of Elk consists of high, narrow ridges separated by deep valleys. The area of the coal is not large, though adequate for local needs. Enoch Township, north of Jefferson, has a small area of coal near the tops of the ridges. A sample from the southwest corner of the township has a heat value of 12,690 B. t. u. The remaining townships east of Duck Creek contain at the most small areas of this coal bed.

West of Duck Creek the Meigs Creek coal bed has suffered less stream erosion and therefore is not confined to ridges and hills. Brookfield Township, which forms the northwest corner of the county, contains a large area of the coal, which has long been mined for local use among the farmers in the village of Cumberland.

Section of Meigs Creek coal bed in mine on Hunter farm, NW. $\frac{1}{4}$ sec. 4, Brookfield Township, Noble County, Ohio.

	Ft. in.
Coal, bony.....	5 $\frac{1}{2}$
Shale.....	3 $\frac{1}{2}$
Coal.....	8 $\frac{1}{2}$
Shale and pyrite.....	3 $\frac{1}{8}$
Coal.....	1 3 $\frac{1}{2}$
Shale and coal.....	1 $\frac{1}{2}$
Coal with two "smut" bands.....	10 $\frac{1}{2}$
Pyrite, quite persistent.....	$\frac{1}{8}$
Coal, hard.....	4 $\frac{1}{2}$
Coal in floor, not mined.....	9 $\frac{1}{2}$
	4 8 $\frac{1}{2}$

A proximate analysis of a sample from this mine shows moisture 4.8, volatile matter 37.3, fixed carbon 48.1, and ash 9.8 per cent; an ultimate analysis gives carbon 66.01, hydrogen 5.26, oxygen 12.35, nitrogen 0.97, sulphur 5.59, and ash 9.82 per cent. The heat value is 12,300 B. t. u.

The coal bed in this mine ranges from 4 feet 4 inches to 5 feet in thickness, but its upper 5 $\frac{1}{2}$ inches consists of bony coal and is generally rejected. Also from 4 to 8 inches of good coal is left in the floor of the mine, owing to the quantity of water that the bed contains. In Sharon Township, which lies south of Brookfield, the coal bed generally is 3 to 3 $\frac{1}{2}$ feet in thickness in the northern part of the township and 4 to 4 $\frac{1}{2}$ feet in the southern part. In places the roof is weak and requires careful timbering. Thin shale partings, balls, and lenses of pyrite are common. Jackson Township forms the southwestern corner of the county and probably has as large an area of this coal bed as any other two townships in the county combined. The coal has been mined by farmers at many places, especially in the northwest part of the township; and from these mines the fuel is hauled for miles in all directions. In many places the bed is divided into two benches by a bed of clay, which may have a thickness of 18 inches. In places in sec. 10 the coal bed is 6 feet thick, but in sec. 19 a bed of sandstone reduces it to 4 feet.

The average of six analyses from samples taken in various parts of the county shows ash 11.6, sulphur 5.58, and moisture 3.3 per cent. The heat value is 12,320 B. t. u.

These results show an increase in sulphur to nearly twice that in Belmont County, a decrease in moisture, and a slight increase in heat value.

Morgan County.—The Meigs Creek coal bed extends west from Noble County into Morgan, where it is of workable thickness nearly everywhere east of Muskingum River but is worthless and in places absent west of that stream. Just east of the river the coal is limited to ridges and hilltops, but nearer the Noble County line it lies lower and hence has been less removed by stream action. The field is drained by Meigs Creek, from which stream the coal received its name.

Manchester Township, forming the northeast corner of the county, contains a large area of the coal, which has long been mined near

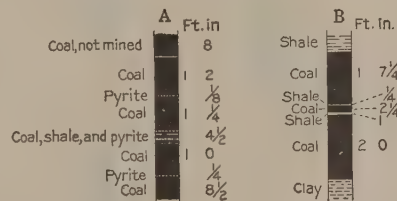


FIGURE 48.—Sections of Meigs Creek (No. 9) coal bed in Morgan County, Ohio. A, Manchester Township; B, Bristol Township.

Reinersville and is hauled thence by farmers many miles.

Section of Meigs Creek coal bed in L. H. Grandstaff mine, in the SW. $\frac{1}{4}$ sec. 29, Manchester Township, Morgan County, Ohio.

[See fig. 48, A.]

	Ft. in.
Clay, reported thickness.....	15 0
Coal, not mined.....	8
Coal.....	1 2
Pyrite.....	$\frac{1}{4}$
Coal.....	1 $\frac{1}{4}$
Coal, shale, and pyrite.....	4 $\frac{1}{2}$
Coal.....	1 0
Pyrite.....	$\frac{1}{4}$
Coal.....	8 $\frac{1}{2}$
	19 11 $\frac{3}{4}$

A proximate analysis of a sample from this mine shows moisture 4.1, volatile matter 37.6, fixed carbon 47.6, and ash 10.7 per cent; an ultimate analysis shows carbon 66.19, hydrogen 5.10, oxygen 12.11, nitrogen 0.87, sulphur 5.07, and ash 10.66 per cent. The heat value is 12,200 B. t. u.

In addition to such impurities as are shown in the section given above numerous paper-like layers of shale traverse the bed. The coal is bright and when iridescent is called peacock

coal. Bristol Township, which lies west of Manchester Township, has thousands of acres of Meigs Creek coal beneath its hills and ridges. One test shows 4.3 per cent sulphur and 12,110 B. t. u. The thickness of the coal bed, where tested (see fig. 48, B), is 3 feet 9½ inches, exclusive of partings. A measurement made on the A. E. Smith farm in sec. 25 shows 5 feet 4 inches of coal in three benches, of which the thickest (10 inches) was not mined. Meigsville Township lies south of Bristol and contains a large area of the Meigs Creek coal.

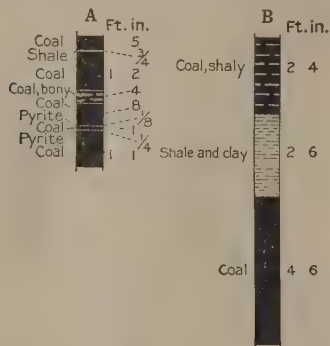


FIGURE 48.—Sections of Meigs Creek (No. 9) coal bed in Ohio. A, Meigsville Township, Morgan County; B, Aurelius Township, Washington County.

Section of Meigs Creek coal bed in F. S. Murray mine, sec. 20, Meigsville Township, Morgan County, Ohio.

[See fig. 49, A.]

Clay.	Ft. in.
Coal, usually about 5 inches thick.....	1 ½
Shale.....	¾
Coal, "smut" streak near middle.....	1 2
Coal; bony.....	4
Coal.....	8
Pyrite.....	½
Coal.....	1
Pyrite.....	¼
Coal.....	1 1
	3 6 ½

A proximate analysis of a sample from this mine shows moisture 5.1, volatile matter 36.1, fixed carbon 47.1, and ash 11.7 per cent; an ultimate analysis gives carbon 64.77, hydrogen 5.06, oxygen 12.67, nitrogen 0.87, sulphur 4.89, and ash 11.74 per cent. The heat value is 11,930 B. t. u.

Center Township forms the southeast corner of the county and contains a larger area of

Meigs Creek coal than any other township in the county. The bed usually ranges from 2 feet 6 inches to 4 feet 4 inches in thickness and is divided into two benches, separated by 1 to 6 inches of shale or impure coal. Both floor and roof are irregular, and the thickness of the bed changes abruptly. Windsor Township, north of Muskingum River, appears to be underlain by a solid block of coal 3 feet to 3 feet 6 inches thick. An average of three analyses from samples taken in different townships shows ash 10.9, sulphur 4.75, and moisture 4.8 per cent. The heat value is 12,080 B. t. u.

Washington County.—In Washington County the Meigs Creek coal bed is present, under a large area between Muskingum and Little Muskingum rivers and north of Cow Run. It is believed to be of workable thickness throughout nearly this area and at three places outside of it—in the valley of Cow Run; a short distance west of Newport, where the Burning Springs anticline brings it far above drainage; and in the extreme southeast corner of the county. The areas of coal in these three places, however, are small and can never be of more than local value.

The Meigs Creek coal bed has been given several names in Washington County, and some people are still confused as to its position. Both the coal bed and the Ames limestone are well shown along the valley of Duck Creek, a short distance north of the Washington County line, and the coal can be followed down this valley to the point where it passes below drainage at the mouth of Cow Run. The position of the coal with reference to the Ames limestone proves it to be the Meigs Creek bed beyond a reasonable doubt. The coal bed is thickest and most persistent in the townships along the northern border of the county and is there a valuable bed which will, some day, be the basis of important mining operations, though at present it is worked for local market only.

Aurelius, the northernmost township in the county, contains a large acreage of Meigs Creek coal, though much has been swept away by Duck Creek. Formerly the fuel was mined for shipment by rail at Macksburg, but the practice was discontinued many years ago.

Section of Meigs Creek coal bed on Charles Schimmel's land, sec. 28, Aurelius Township, Washington County, Ohio.

	Ft.	in.
Coal, lower part only of upper bench.....	9	$\frac{1}{2}$
Shale and clay.....	1	3
Coal.....		8
Shale.....		$\frac{5}{8}$
Coal.....	2	3 $\frac{1}{2}$
	5	$\frac{3}{8}$

A proximate analysis of a sample from this mine shows moisture 3.4, volatile matter 37.9, fixed carbon 49.1, and ash 9.6 per cent; an ultimate analysis gives carbon 68.33, hydrogen 5.31, oxygen 10.85, nitrogen 0.90, sulphur 5.03, and ash 9.58 per cent. The heat value is 12,750 B. t. u.

Section of Meigs Creek coal bed on A. F. Wooster's land, in valley of Duck Creek, Aurelius Township, Washington County, Ohio.

	Ft.	in.
Coal.....	2	6
Shale.....	1	3
Coal.....	2	10
	6	7

Another section of the Meigs Creek coal bed in Aurelius Township is shown in figure 49, B.

Salem Township, which lies south of Aurelius, is crossed by the deep valley of Duck Creek. The coal appears to be present in this township wherever it is due and to be of good thickness. It has been worked on many farms and is the local source of fuel among the residents. Along Bear Creek, in the southwest part of the township, the coal bed measures 4 to 5 feet and is almost free from partings. East of Duck Creek, in this township, the bed is thick and is divided into two benches by a thick bench of shale or clay.

Section on Twiggs farm on Pawpaw Creek, Salem Township, Washington County, Ohio.

	Ft.	in.
Coal.....	2	6
Shale.....	1	0
Coal.....	3	0
	6	6

The coal is thinner in the southern part of the township, where it measures about 4 feet; over the line in Fearing Township it is still thinner and is probably worthless.

The Meigs Creek coal is well developed in the parts of Waterford and Adams townships east of Muskingum River, where it usually

ranges from 2 to 4 feet in thickness and is divided into two parts by a thick bed of shale or clay. The best known mine is at Coal Run, on Muskingum River. It has been worked discontinuously for 25 years and supplies many farmers and occasionally ships a barge load to Marietta.

Section of Meigs Creek coal bed in the Felix mine at Coal Run, Washington County, Ohio.

	Ft.	in.
Clay.....		
Coal.....		6
"Smut" streak.....		$\frac{3}{8}$
Coal.....	1	4
Coal, pyrite and shale.....		3 $\frac{1}{2}$
Coal, with two pyrite streaks.....		11 $\frac{1}{2}$
Coal, forming floors in entries.....		4
	3	5 $\frac{1}{2}$

A proximate analysis of a sample from this mine shows moisture 2.9, volatile matter 37.5, fixed carbon 46.7, and ash 12.9 per cent; an ultimate analysis gives carbon 65.88, hydrogen 5.05, oxygen 9.71, nitrogen 0.92, sulphur 5.55, and ash 12.89 per cent. The heat value is 12,250 B. t. u.

In Liberty Township and the northwest part of Ludlow the coal bed has a good thickness and is well exposed along Campbells Run and Pawpaw Creek. The following measurement was made in a cut at Germantown:

Section of Meigs Creek coal bed at Germantown, Ohio.

	Ft.	in.
Coal.....	2	6
Clay.....	1	6
Coal.....	3	0
	7	0

The lower bench appears to be the better in quality, though both are mined.

Section on McCurdy farm, in the NW. $\frac{1}{4}$ sec. 34, Ludlow Township, Washington County, Ohio.

	Ft.	in.
Coal.....	2	2
Clay.....	1	0
Coal.....	2	4
	5	6

The coal bed thins abruptly to the north in Ludlow Township, and on the Payne farm in sec. 16 it measures only 8 inches. The quantity of coal in Liberty and Ludlow townships is large and as yet has scarcely been touched by the miner. Like the rest of the Meigs Creek coal in Ohio it forms a large fuel reserve for future generations.

Monroe County.—The area of the Meigs Creek coal bed above drainage in Monroe County is small and is confined to a narrow strip that borders Noble County and that may be considered as an extension of the Noble County field and to a small area near the hamlet of Mechanicsburg, in the southeast corner of Perry Township. Probably not more than two sections in Seneca Township have the coal in workable thickness, but Franklin and Bethel townships have larger areas and in them coal is mined on several farms. The coal bed is thickest along the Noble County line, where it measures about 4 feet. Eastward it thins abruptly and beyond the middle of the townships is of minable thickness in few if any places. The coal bed consists of two benches, separated by shale, 6 to 18 inches thick.

Probably the Meigs Creek coal of Belmont County extends south into northern Monroe County but is below drainage, and specific data as to its thickness and quality are lacking.

Muskingum and Guernsey counties.—The Meigs Creek coal underlies the high hills and ridges in the southeast corner of Muskingum County and to a much smaller extent in the adjacent part of Guernsey County. Meigs and Rich Hill contain more of this coal bed than do any other townships in Muskingum County; the bed generally measures 3 to 4 feet in thickness and contains two or more shale partings.

UNIONTOWN AND WAYNESBURG COAL BEDS.

Near the village of Harrisville, in the extreme southeast corner of Harrison County, the Uniontown coal is found in the highest hills, about 100 feet above the Meigs Creek bed, and was formerly mined on a very small scale. In northern Belmont County it is also found 100 to 110 feet above the Meigs Creek coal. The bed is about 2 feet thick at Flushing but thickens a little to the east, and in Colerain Township measures 3 to 4 feet. The position of this coal bed with reference to those below is shown in the section below:

Section at Barton, Ohio.

[By J. E. Hyde.]

	Ft.	in.
Shale with a few thin layers of sandstone.....	25	0
Coal, Uniontown.....	3	0
Unseen.....	45	0
Sandstone, thin bedded.....	13	0
Limestone.....	10	8
Shale.....	3	0

	Ft.	in.
Unseen.....	7	4
Limestone.....	3	0
Unseen.....	12	6
Sandstone, shaly.....	3	5
Limestone and shale.....	19	2
Limestone.....	13	2
Limestone and shale.....	20	1
Shale.....	1	10
Coal, Meigs Creek.....	2	3
Sandstone, shaly.....	5	2
Shale, black.....	2	
Coal.....	8	
Shale and very thin limestone layers.....	4	0
Shale.....	5	2
Unseen.....	5	0
Limestone and shale.....	41	4
Unseen.....	25	0
Coal, Pittsburgh.....		
	268	11

The Uniontown coal, according to Hyde, ranges from 110 to 145 feet above the Meigs Creek coal in this part of Belmont County. It is known locally as the "Three-foot seam" and has been mined in a very small way at several places in Colerain Township. About 100 feet above the Uniontown coal in this part of Belmont County is another coal bed in the hilltops which is known among the farmers as the "Upper Six-foot bed" and also as the "Cut seam," from its exposure in the cut on the Colerain pike at the top of the hill back of Martins Ferry. This coal, which has been worked at Colerain, is of poor quality and belongs in the Dunkard group. In Pease Township, which lies east of Colerain, the Uniontown or "Three-foot" coal has been worked at a number of places, especially in secs. 35 and 36. In that locality a coal bed 2 feet 6 inches in thickness was noted lying from 25 to 40 feet below the Uniontown coal.

The Uniontown coal has been mined by farmers at many other places in Belmont County. Near St. Clairsville the coal has been mined on a number of farms, but the bed is thin and the output very small. In the vicinity of Belmont, Goshen Township, in the southeast corner of Union Township, and along the southward-flowing tributaries of Captina Creek this coal has been worked in numerous places. To sum up, the Uniontown coal occupies large areas in the hills of Belmont County, but the bed is thin and the coal of rather poor quality. Although it has been mined on many farms the quantity removed is insignificant, and it may be regarded as a fuel reserve which will

be eagerly sought when the underlying Pittsburgh and Meigs Creek coals have been exhausted. Two or three western States are now mining coals for railroad shipment that are not thicker and apparently are not superior in quality to the Uniontown. This coal is mined by farmers along Sunfish Creek and probably at several other places in Monroe County.

The Waynesburg coal, which forms the summit of the Monongahela formation, is of very little value as a source of fuel. Its thickness varies and it is only in small areas that it is workable. The coal is at its best in the southern part of Belmont County, where it ranges in thickness from 2 to 4 feet. Condit reports that it is mined in the vicinity of Alledonia station, at Somerton, and along Bend Fork east of Hunter. It was formerly mined on the Yocum farm near Somerton, Somerset Township, for use in a mill, but the mine was abandoned because of trouble with water. The coal is reported to be less than 3 feet thick and of poor quality. It thins to the south and in the adjacent part of Monroe County is reported worthless.

COAL BEDS OF THE DUNKARD GROUP.

The Dunkard group, formerly known as the "Upper Barren Coal Measures," is the youngest formation in Ohio and is found only in the high hills and ridges in the eastern and southern parts of the State. The group includes two formations, the Greene above and the Washington below. Orton assigned to it a thickness of 500 feet, but recent work by Stauffer increases this to 636 feet. The formation rests on the Waynesburg coal, the top member of the Monongahela formation, and extends from that bed to the tops of the highest hills and ridges.

The following section, measured by C. R. Stauffer, shows the composition of the group as exposed near Jacobsburg, Belmont County:

Section of Dunkard group and upper part of the Monongahela formation in Belmont County, Ohio.

Dunkard group:

	Ft.	in.
Shale, gray, to top of hill back of barn on A. R. Kelsey's farm.....	12	8
Sandstone, rather massive, micaceous, gray, passing into shale.....	3	8
Shale, gray.....	17	2
Shale, black to bluish, resembling a coal blossom; contains plant fragments.....	2	10
Limestone, clayey, gray; weathers rapidly...	3	1

	Ft.	in.
Shale, blue to drab, soft.....	1	4
Limestone, gray, containing ostracodes.....		9
Shale, gray, with some limestone nodules.....		11
Limestone, nodular, gray.....	1	3
Shale, soft, gray, with numerous calcareous nodules.....	11	0
Sandstone, thin bedded, gray.....	2	0
Shale, soft, fissile, gray.....	11	6
Limestone, drab, in thin layers, with calcareous shale between; fossiliferous; Upper Washington limestone member.....	3	0
Shale, soft, clayey, red and gray.....	21	4
Concealed (aneroid reading).....	10	0
Sandstone, gray.....	1	4
Concealed (aneroid reading).....	16	0
Sandstone, thin, cross-bedded.....	4	0
Shale, soft, gray.....	20	0
Limestone, compact drab and clayey gray shale; lower layer nodular; fossiliferous; Middle Washington limestone member.....	6	10
Shale, gray and red, with several thin coal blossoms and nodules of sandstone.....	25	4
Coal, Washington.....	4	6
Shale, greenish gray to buff, with a few concretionary nodules.....	17	6
Sandstone, micaceous, gray.....	5	10
Shale, micaceous, sandy, gray.....	5	10
Sandstone, gray to yellowish, micaceous, laminated.....	13	8
Shale, gray to buff, containing some small iron nodules.....	19	0
Sandstone, micaceous, gray.....	1	5
Shale, sandy, gray to buff, micaceous.....	12	2
Sandstone, gray, laminated, micaceous.....	2	9
Shale, fissile, gray.....	9	10
Sandstone, micaceous, gray.....	1	10
Shale, gray to buff, sandy.....	8	10
Limestone, blue, shaly, containing ostracodes; Elm Grove limestone member.....	1	4
Shale, gray.....	2	0
Monongahela formation:		
Coal, Waynesburg, upper bench.....	1	0
Shale, gray to drab, sandy, micaceous.....	2	9
Sandstone, gray, cross-bedded and in places shaly, micaceous; contact with coal below irregular.....	5	8
Coal, Waynesburg, lower bench.....	1	6
Level of Ohio River & Western Railway at School No. 12.		

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Concerning the rocks of the Dunkard, Stauffer writes:

A large part of the Dunkard in Ohio is to be classed as red beds, although the Monongahela formation and even the Conemaugh are not without their red shales, which in the Monongahela are often so like those of the Dunkard as to make them easily confused if it were not for other rather easily identified strata associated therewith. There are but few really red sandstones and those usually only coated red on the outside or weathered surface in the Dunk-

ard formation of Ohio. The red is thus almost confined to the shale. In the northern part of the Dunkard area the red beds are to be found chiefly in the upper part of the formation, but to the southward most of the shale in the whole formation is red. In the main these shales, sandstones, limestones, and beds of coal represent land, swamp, and fresh-water deposits, but the presence of gypsum in certain of the shales and sandstones and again marine or brackish-water fossils in other beds indicates that these conditions at times gave place to others of a very different character.

From the economic standpoint the shales and sandstones occupy the place of most importance both now and for the future. The shales are being utilized, at Marietta, in the manufacture of brick, while in the same general locality three or four of the sandstones are extensively used in the manufacture of grindstones.

The coals of the Dunkard have little or no value in Ohio. The principal beds are the Waynesburg "A," Washington, Washington "A," Jollytown, Dunkard, and Nineveh, but these are in many places represented by streaks only, and not one of them is regularly mined in Ohio. Near Alledonia, Belmont County, the Waynesburg "A" coal is 18 inches thick and has been worked in a few places by farmers. The Washington is the best developed and most persistent coal bed in the Dunkard. It

measured over 7 feet in the deep cut on the Colerain pike above Martins Ferry but is impure and can not be marketed under existing conditions. This coal is found elsewhere in Belmont County and in places in Monroe and Washington counties. Farmers have tested it at many places but have always been disappointed.

COMPOSITION OF OHIO COALS.

The following tables showing the composition of Ohio coals were compiled from Bulletin 9 of the Ohio Geological Survey and from recent publications of the United States Geological Survey and Bureau of Mines.

The samples were cut under the same general conditions, which are those prescribed by the United States Geological Survey. It is believed, therefore, that comparisons can safely be made and that the figures are a fair representation of the composition of Ohio coals.

In the "Reference" column "Ohio" refers to the Geological Survey of Ohio, "Mines" to the United States Bureau of Mines, and "U.S.G.S." to the United States Geological Survey.

Analyses of Ohio coals.

[Made by Ohio Geological Survey, U. S. Bureau of Mines, and the United States Geological Survey.]

Sharon coal (No. 1).

County.	Township.	Mine or laboratory number.	Proximate.			Ultimate.						British thermal units. ¹	Reference.	
			Mols-ture.	Volatile matter.	Fixed carbon.	Ash.	Sul-phur.	Hydro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.		Organiza-tion.	Bull. No.
Jackson.....	Liberty.....	15188	13.6	31.8	50.4	4.2	0.86	.....	.....	.....	.....	11,680	Mines.....	.....
Do.....	do.....	15189	12.8	31.5	47.9	7.8	.97					11,270	do.....	

Quakertown coal (No. 2).

Jackson.....	Milton.....		9.3	33.0	54.2	3.5	1.25					12,530	Ohio.....	
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Clarion coal (No. 4a).

Lawrence.....	Decatur.....	65	6.3	35.3	41.0	17.41	5.29	4.91	57.92	1.07	13.40	10,740	Ohio.....	9
Do.....	do.....	67	5.9	37.2	41.6	15.23	5.36	5.06	60.22	1.18	12.90	11,130	do.....	9
Do.....	do.....	68	6.1	38.5	45.5	9.94	3.61	5.42	65.53	1.22	14.28	11,960	do.....	9
Do.....	Washington.....	66	6.0	39.1	43.0	11.86	5.10	5.26	63.32	1.22	13.24	11,730	do.....	9
Scioto.....	Bloom.....	64	6.8	37.9	46.0	9.34	3.45	5.33	65.30	1.23	15.35	11,760	do.....	9
Jackson.....	Madison.....	63	4.9	35.7	45.7	13.70	6.14	4.89	62.57	1.23	11.47	11,500	do.....	9
Do.....	Bloomfield.....	62	5.3	37.4	43.8	13.54	6.08	4.98	62.05	1.23	12.12	11,380	do.....	9
Do.....	Milton.....	55	5.6	38.9	47.4	8.09	3.70	5.47	67.30	1.28	14.16	12,280	do.....	9
Do.....	do.....	56	5.0	39.7	45.5	9.80	4.08	5.59	66.14	1.28	13.31	12,150	do.....	9
Do.....	do.....	57	4.7	40.5	46.2	8.61	3.73	5.44	67.51	1.26	13.45	12,360	do.....	9
Do.....	do.....	60	5.3	41.0	45.3	8.40	3.72	5.50	66.52	1.28	14.58	12,210	do.....	9
Do.....	do.....	1896	8.4	41.3	43.6	6.7	3.10	.....	.....	.....	.....	12,250	U. S. G. S.	290
Do.....	do.....	1897	7.5	39.3	42.7	10.5	5.44	.....	.....	.....	.....	.....	do.....	290
Vinton.....	Wilkesville.....	59	4.7	39.9	44.2	11.21	4.16	5.36	65.04	1.28	12.95	12,050	Ohio.....	9
Do.....	do.....	61	4.5	40.1	46.5	8.85	4.23	5.44	67.17	1.28	13.03	12,340	do.....	9
Do.....	do.....	2208	6.8	40.0	45.5	7.7	3.34	.....	.....	.....	.....	12,510	U. S. G. S.	290
Do.....	do.....	2209	7.4	41.6	44.8	6.2	2.77	.....	.....	.....	.....	.....	do.....	290
Do.....	Vinton.....	54	5.0	40.3	46.5	8.21	2.81	5.49	68.52	1.28	13.09	12,470	Ohio.....	9
Do.....	do.....	58	4.6	41.4	42.9	11.10	5.28	5.36	64.91	1.30	12.05	12,050	do.....	9
Do.....	Madison.....	70	5.0	39.9	46.1	8.97	3.32	5.48	67.92	1.33	12.98	12,530	do.....	9
Do.....	Elk.....	69	4.9	39.2	46.6	9.32	3.53	5.40	67.17	1.30	13.28	12,450	do.....	9

¹ British thermal units may be reduced to pound calories by multiplying by 0.5556 and to French calories by multiplying by 0.252.

THE COAL FIELDS OF OHIO.

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Analyses of Ohio coals—Continued.

Lower Kittanning coal (No. 5).

County.	Township.	Mine or labora- tory number.	Proximate.			Ultimate.						Reference.		
			Mois- ture.	Volatile matter.	Fixed carbon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	British thermal units.	Organiza- tion.	Bull. No.
Lawrence.	Perry	74	7.6	38.5	45.1	8.79	3.20	5.59	66.71	1.27	14.44	12,200	Ohio	9
Do.	Elizabeth	75	8.1	34.5	47.7	9.71	2.13	5.44	65.54	1.23	15.95	11,930	do.	9
Jackson.	Milton.	76	8.4	35.2	49.0	7.42	2.65	5.47	66.63	1.37	16.46	12,190	do.	9
Do.	do.	1898	9.4	36.7	46.3	7.6	4.08					11,900	U. S. G. S.	290
Do.	do.	1899	9.0	37.8	43.9	9.3	4.41						do.	290
Perry	Pike	71	6.8	35.2	47.8	10.16	4.72	5.26	64.78	1.22	13.86	11,860	Ohio	9
Do.	do.	72	6.7	37.1	49.1	7.12	2.58	5.47	68.34	1.24	15.25	12,390	do.	9
Muskingum	Washington.	73	5.0	39.8	47.4	7.77	4.80	5.37	68.07	1.18	12.81	12,570	do.	9
Jefferson.	Knox	77b	2.5	38.5	51.6	7.40	3.82	5.38	74.20	1.27	7.93	13,660	do.	9
Tuscarawas.	Sandy.	77	5.3	38.7	48.3	7.71	3.25	5.46	69.75	1.18	12.65	12,900	do.	9
Do.	do.	3968	5.6	36.3	49.4	8.7	2.89						U. S. G. S.	332
Do.	do.	3969	4.5	39.9	47.1	8.5	3.73					12,850	do.	332
Mahoning.	Green.	77a	5.2	36.9	53.2	4.72	2.17	5.50	73.84	1.41	12.36	13,500	Ohio.	9

Middle Kittanning coal (No. 6).

Lawrence.	Perry.	136	6.0	39.1	50.1	4.82	3.61	5.56	71.82	1.33	12.86	13,170	Ohio.	9
Do.	do.	82a	6.6	34.3	48.2	10.92	3.32	5.16	64.95	1.23	14.42	11,930	do.	9
Gallia.	Greenfield.	82b	8.1	37.5	45.9	8.52	3.64	5.48	65.71	1.18	15.47	12,090	do.	9
Athens.	Canaan.	89a	6.4	34.2	50.9	8.49	.51	5.40	69.25	1.43	14.92	12,450	do.	9
Do.	Athens.	83	6.2	36.4	49.6	7.82	.90	5.43	69.22	1.30	15.33	12,360	do.	9
Do.	Waterloo.	84	6.7	35.4	51.2	6.75	2.28	5.49	69.21	1.18	15.09	12,460	do.	9
Do.	do.	85	6.8	36.9	48.2	8.05	2.14	5.49	67.40	1.37	15.55	12,230	do.	9
Vinton.	Swan.	82	4.9	39.2	45.8	10.15	4.25	5.40	66.26	1.23	12.71	12,320	do.	9
Hocking.	Starr.	81	6.5	38.3	47.2	8.03	3.52	5.49	67.33	1.20	14.43	12,350	do.	9
Do.	Ward.	7712	9.7	32.5	53.4	4.43	.54	5.70	69.50	1.25	18.38	12,450	Mines.	22
Do.	do.	86	7.5	34.0	52.6	5.85	.77	5.52	70.05	1.42	16.39	12,510	Ohio.	9
Do.	do.	87	7.5	35.0	52.7	4.81	.66	5.53	71.04	1.43	16.53	12,700	do.	9
Do.	do.	88	7.4	34.2	53.4	5.00	1.06	5.55	70.58	1.32	16.49	12,650	do.	9
Athens.	Green.	80	6.5	37.3	49.2	6.97	2.57	5.45	68.40	1.18	15.43	12,420	do.	9
Do.	Dover.	89	7.2	34.2	51.9	6.72	1.85	5.56	69.32	1.30	15.45	12,350	do.	9
Do.	Trimble.	90	7.3	32.4	53.6	6.73	.86	5.45	69.46	1.34	16.16	12,410	do.	9
Perry.	Salt Lick.	79	7.7	33.5	51.3	7.47	1.45	5.48	68.30	1.18	16.14	12,190	do.	9
Do.	do.	1900	10.8	34.9	48.2	6.1	1.11	.....	.....	.....	.....	11,990	U. S. G. S.	290
Do.	do.	1901	9.8	35.7	48.5	6.0	1.43	.....	.....	.....	.....	.....	do.	290
Do.	Monroe.	91	6.8	35.5	51.8	5.91	1.00	5.49	70.30	1.30	16.00	12,570	Ohio.	9
Do.	Pike.	78	7.0	37.1	48.9	6.95	2.33	5.58	68.29	1.26	15.99	12,380	do.	9
Do.	do.	92	5.2	38.9	46.0	9.98	3.43	5.38	66.05	1.18	14.10	12,190	do.	9
Do.	do.	2119	8.9	38.6	46.7	5.8	3.00	.....	.....	.....	.....	.....	do.	290
Do.	do.	2120	8.9	39.3	47.8	4.0	1.74	.....	.....	.....	.....	.....	do.	290
Do.	Bearfield.	93	5.9	36.6	47.4	10.10	4.96	5.26	65.43	1.22	13.03	12,040	do.	9
Do.	Hays.	95	6.7	38.3	48.4	6.64	2.43	5.61	68.45	1.29	15.58	12,430	do.	9
Do.	Harrison.	94	7.2	37.6	49.9	5.26	2.34	5.60	69.77	1.26	15.77	12,610	do.	9
Do.	do.	97	8.5	38.8	47.0	8.45	3.38	5.37	67.77	1.18	13.85	12,330	do.	9
Do.	do.	98	6.4	38.0	48.0	7.58	2.72	5.49	68.06	1.26	14.89	12,360	do.	9
Muskingum.	Brush Creek.	101	5.1	39.7	45.4	9.77	5.54	5.32	65.74	1.14	12.49	12,240	do.	9
Do.	Harrison.	100	4.7	40.3	45.2	9.83	4.10	5.38	67.71	1.16	11.82	12,370	do.	9
Do.	Newton.	96	5.0	38.2	47.2	9.56	5.97	5.29	65.88	1.12	12.18	12,160	do.	9
Do.	Washington.	99	5.4	39.2	46.1	9.28	3.77	5.34	67.16	1.18	13.27	12,280	do.	9
Do.	Muskingum.	104	5.5	40.3	49.0	5.23	8.63	5.57	70.54	1.26	13.77	12,940	do.	9
Do.	Madison.	102	4.7	39.9	48.1	9.28	5.35	5.35	66.69	1.28	12.05	12,340	do.	9
Do.	do.	103	4.6	41.0	47.8	6.58	4.49	5.47	69.68	1.30	12.58	12,830	do.	9
Coshocton.	Linton.	111	4.4	40.9	49.3	5.36	3.61	5.56	71.34	1.28	12.85	13,050	do.	9
Do.	do.	112	10.9	34.0	48.5	6.64	2.03	5.37	63.08	1.15	21.73	11,040	do.	9
Do.	Franklin.	108	4.3	41.1	49.0	5.59	4.00	5.41	71.42	1.22	12.36	13,080	do.	9
Do.	Virginia.	109	5.1	39.0	48.9	7.02	3.87	5.45	69.49	1.20	12.97	12,720	do.	9
Do.	Jackson.	103	5.3	40.9	47.5	6.50	4.22	5.50	69.29	1.24	13.45	12,760	do.	9
Do.	Lafayette.	110	5.6	34.7	46.4	13.28	4.87	4.95	61.59	1.08	14.23	11,200	do.	9
Do.	Oxford.	113	4.4	40.7	50.4	4.45	3.54	5.53	72.65	1.35	12.48	13,230	do.	9
Do.	Adams.	114	4.6	39.2	47.5	8.75	6.36	5.40	67.51	1.24	11.74	12,850	do.	9
Do.	White Eyes.	118	5.3	37.4	48.7	8.60	4.36	5.32	67.41	1.18	13.13	12,390	do.	9
Do.	do.	120	4.5	38.7	50.8	5.97	3.63	5.53	70.94	1.30	12.63	12,910	do.	9
Do.	Keene.	107	5.4	39.9	49.6	5.08	3.18	5.58	70.90	1.24	14.02	12,950	do.	9
Do.	Crawford.	117	4.7	39.2	44.8	11.29	5.80	5.23	64.78	1.12	11.98	11,870	do.	9
Do.	Clark.	106	5.3	39.1	49.5	6.15	3.72	5.50	69.59	1.12	13.92	12,750	do.	9
Tuscarawas.	Salem.	133	3.4	40.0	48.9	7.67	5.22	5.30	70.02	1.26	10.53	12,840	do.	9
Do.	Clay.	131	3.4	39.7	47.5	9.38	4.88	5.23	68.77	1.30	10.44	12,550	do.	9
Do.	Jefferson.	115	4.7	40.3	49.5	5.47	4.05	5.53	71.08	1.32	12.55	12,960	do.	9
Do.	Mill.	130	3.8	38.3	49.5	8.42	3.83	5.26	70.31	1.22	10.96	12,780	do.	9
Do.	Dover.	121	3.5	40.3	50.2	6.01	8.17	5.41	72.13	1.28	12.00	13,140	do.	9
Do.	do.	122	4.9	36.2	49.4	9.50	4.19	5.14	67.54	1.30	12.53	12,340	do.	9
Do.	Goshen.	123	3.5	41.6	47.2	7.69	4.56	5.45	70.26	1.22	10.82	12,880	do.	9
Do.	Fairfield.	138	7.1	38.3	50.0	4.56	2.62	5.64	71.29	1.23	14.66	12,950	do.	9
Do.	do.	127	4.7	39.2	49.9	6.22	3.28	5.48	70.80	1.28	12.94	12,780	do.	9
Do.	Lawrence.	125	4.7	39.5	46.7	9.06	4.70	5.30	67.59	1.24	12.11	12,390	do.	9
Do.	Sandy.	126	4.9	38.2	49.9	7.04	2.91	5.40	70.45	1.28	12.92	12,750	do.	9
Holmes.	Walnut Creek.	119	7.3	34.9	53.5	4.21	1.00	5.42	70.62	1.44	17.31	12,510	do.	9
Carroll.	Orange.	132	3.8	39.1	50.3	6.79	3.06	5.38	71.90	1.40	11.40	13,030	do.	9
Stark.	Sandy.	135	6.7	36.2	48.9	8.22	2.66	5.37	68.94	1.20	13.61	12,560	do.	9
Do.	Nimishillen.	139	5.6	38.5	45.8	10.08	4.13	5.29	66.92	1.19	12.39	12,360	do.	9
Columbiana.	Liverpool.	137	3.6	36.2	55.6	4.60	1.76	5.46	77.06	1.38	9.74	14,020	do.	9

Analyses of Ohio coals—Continued.

Lower Freeport coal (No. 6a).

County.	Township.	Mine or laboratory number.	Proximate.			Ultimate.						British thermal units.	Reference.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.		Organization.	Bull. No.
Jefferson.....	Springfield.....	10533	3.4	37.6	52.0	7.0	2.40	.....	.....	.....	.....	13,220	U. S. G. S.	531
Do.....	Do.....	15388	3.7	37.4	51.2	7.7	3.07	.....	.....	.....	.....	13,250	Do.....	531
Do.....	Do.....	15389	3.5	38.3	50.8	7.4	2.99	.....	.....	.....	.....	13,250	Do.....	531
Do.....	Do.....	15390	3.3	38.9	50.3	7.5	3.23	.....	.....	.....	.....	13,250	Do.....	531
Do.....	Do.....	15391	3.6	37.6	49.1	9.7	3.08	.....	.....	.....	.....	12,880	Do.....	531
Do.....	Do.....	15392	3.5	38.6	49.6	8.3	2.40	.....	.....	.....	.....	13,220	Do.....	531
Do.....	Do.....	15393	4.1	38.6	48.9	8.4	2.95	.....	.....	.....	.....	13,020	Do.....	531
Do.....	Do.....	15440	3.4	38.0	52.4	6.2	2.20	.....	.....	.....	.....	13,530	Do.....	531
Do.....	Do.....	15441	3.5	37.9	50.6	8.0	3.14	.....	.....	.....	.....	13,260	Do.....	531
Do.....	Do.....	15443	3.6	37.0	50.7	8.74	3.70	5.19	71.30	1.39	9.68	13,000	Do.....	531
Do.....	Staubenville.....	15675	3.8	35.9	53.4	6.85	1.90	5.24	74.20	1.45	10.36	13,350	Do.....	531
Do.....	Do.....	15676	3.8	35.4	53.4	7.4	1.91	.....	.....	.....	.....	13,220	Do.....	531

Upper Freeport coal (No. 7).

Lawrence.....	Lawrence.....	147	7.2	32.2	49.9	10.67	2.33	5.03	65.03	1.25	15.69	11,800	Ohio.....	9
Do.....	Aid.....	144	7.8	32.9	47.1	12.18	2.66	5.09	63.03	1.25	15.79	11,350	Do.....	9
Do.....	Do.....	145	8.4	31.8	51.6	8.23	1.29	5.21	66.94	1.31	17.02	11,870	Do.....	9
Do.....	Do.....	146	8.4	31.3	49.0	11.28	1.93	5.10	65.20	1.28	16.21	11,500	Do.....	9
Do.....	Symmes.....	140	7.1	33.7	50.3	8.01	1.31	5.33	67.09	1.28	16.08	12,000	Do.....	9
Do.....	Do.....	141	8.8	31.7	50.8	8.71	.76	5.32	66.88	1.25	17.08	11,860	Do.....	9
Do.....	Do.....	143	8.4	31.5	50.0	10.09	1.84	5.18	64.90	1.27	16.72	11,700	Do.....	9
Gallia.....	Walnut.....	142	7.6	32.9	47.1	12.39	1.81	5.19	63.48	1.28	15.85	11,470	Ohio.....	9
Muskingum.....	Harrison.....	148	4.9	42.3	45.0	7.78	4.36	5.53	67.74	1.17	13.42	12,500	Do.....	9
Do.....	Brush Creek.....	149	4.7	43.5	44.2	7.55	5.00	5.55	68.27	1.32	12.30	12,680	Do.....	9
Do.....	Wayne.....	150	5.1	35.5	64.8	11.28	1.93	5.10	64.30	1.28	12.39	11,800	Do.....	9
Coshocton.....	Clark.....	151	6.4	37.9	52.5	3.19	2.01	5.67	72.72	1.25	15.16	13,190	Do.....	9
Guernsey.....	Center.....	2090	6.3	35.8	50.6	7.3	3.55	.....	.....	.....	.....	12,700	U. S. G. S.	230
Do.....	Do.....	2091	5.8	35.9	50.7	6.6	2.62	.....	.....	.....	.....	12,790	Do.....	230
Do.....	Valley.....	20245	6.9	34.1	53.3	5.7	.84	.....	.....	.....	.....	13,000	Do.....	621
Do.....	Do.....	20246	6.2	33.2	52.3	5.3	.86	.....	.....	.....	.....	12,780	Do.....	621
Do.....	Richland.....	20251	5.4	35.8	50.8	8.0	1.64	.....	.....	.....	.....	12,630	Do.....	621
Do.....	Do.....	20252	6.4	33.7	52.1	7.8	2.16	.....	.....	.....	.....	12,430	Do.....	621
Do.....	Center.....	20253	6.1	35.2	51.8	9.9	1.62	.....	.....	.....	.....	12,660	Do.....	621
Do.....	Do.....	20255	6.0	35.7	50.4	7.9	2.15	.....	.....	.....	.....	12,730	Do.....	621
Noble.....	Noble.....	17213	4.9	37.8	48.9	8.4	2.95	.....	.....	.....	.....	12,700	Minas.....	85
Do.....	Do.....	17214	5.1	37.2	49.6	8.1	2.99	.....	.....	.....	.....	12,700	Do.....	85

Pittsburgh coal (No. 8).

Gallia.....	Ohio.....	25	5.8	36.7	47.4	10.06	4.34	5.16	64.94	1.10	14.40	11,790	Ohio.....	9
Do.....	Harrison.....	27	7.0	36.1	47.9	9.03	5.21	5.24	64.91	1.01	14.00	11,850	Do.....	9
Do.....	Do.....	28	7.8	34.1	48.3	9.76	3.89	5.18	64.59	1.09	15.49	11,780	Do.....	9
Do.....	Green.....	26	6.7	34.4	45.9	13.03	4.37	5.11	62.30	1.14	14.05	11,440	Do.....	9
Athens.....	Do.....	23	5.8	37.4	48.8	8.00	4.19	5.10	67.55	1.05	14.17	12,300	Do.....	9
Do.....	Berne.....	24	6.6	35.1	48.1	10.20	3.41	5.13	66.61	.93	13.72	11,890	Do.....	9
Do.....	Do.....	24	4.5	38.2	45.8	11.49	4.83	5.10	65.92	.99	11.02	11,950	Do.....	9
Morgan.....	Homer.....	22	6.9	40.5	44.4	8.19	4.22	5.32	67.39	.90	13.98	12,100	Do.....	9
Guernsey.....	Millwood.....	20178	4.4	41.1	45.8	8.74	4.85	5.37	69.30	1.26	10.48	12,710	U. S. G. S.	621
Belmont.....	Washington.....	9	2.8	37.9	49.9	9.42	5.09	5.25	69.76	1.09	9.39	12,990	Ohio.....	9
Do.....	Somerset.....	11	4.1	37.1	48.2	10.61	4.95	4.89	68.77	1.10	9.68	12,480	Do.....	9
Do.....	Do.....	20187	4.1	42.7	43.9	9.3	4.40	.....	.....	.....	.....	12,780	U. S. G. S.	621
Do.....	Do.....	20188	3.7	43.3	44.4	8.6	4.45	.....	.....	.....	.....	12,950	Do.....	621
Do.....	Do.....	20230	3.7	41.0	45.8	9.5	4.57	.....	.....	.....	.....	12,760	Do.....	621
Do.....	Mead.....	8	2.9	37.9	51.2	8.00	4.31	5.11	72.95	1.04	8.59	13,210	Ohio.....	9
Do.....	Pultney.....	2095	4.0	38.8	49.1	8.1	3.49	.....	.....	.....	.....	13,100	U. S. G. S.	290
Do.....	Do.....	3986	4.1	39.2	48.7	8.0	4.12	.....	.....	.....	.....	13,000	Do.....	332
Do.....	Do.....	3988	3.1	40.8	50.1	6.0	3.42	.....	.....	.....	.....	13,600	Do.....	332
Do.....	Do.....	3	3.5	39.6	51.0	6.86	3.76	5.45	72.06	1.17	10.70	13,190	Ohio.....	9
Do.....	Do.....	4	3.8	37.2	50.1	8.95	4.27	5.23	70.57	1.20	9.78	12,780	Do.....	9
Do.....	Smith.....	7	3.2	36.8	52.7	7.26	4.28	5.14	71.49	1.06	10.77	13,140	Do.....	9
Do.....	Warren.....	10	4.5	37.5	47.0	11.01	4.67	5.17	67.64	1.08	10.43	12,380	Do.....	9
Do.....	Union.....	6	3.8	38.0	47.4	10.84	4.76	5.09	67.41	1.11	10.79	12,360	Do.....	9
Do.....	Do.....	5	4.4	36.0	48.8	10.76	4.45	4.85	68.24	1.10	10.60	12,430	Do.....	9
Do.....	Pease.....	1	3.4	36.8	51.9	7.86	2.97	5.21	71.45	1.24	11.27	12,990	Do.....	9
Do.....	Colerain.....	2	3.8	36.4	50.8	9.00	4.16	5.14	70.41	1.09	10.20	12,860	Do.....	9
Do.....	Wheeling.....	6a	4.9	33.5	51.9	10.35	3.95	5.19	68.17	1.05	11.25	12,430	Do.....	9
Do.....	Flushing.....	2a	4.2	36.8	50.2	9.21	4.17	5.14	68.75	1.09	11.64	12,610	Do.....	9
Do.....	Do.....	3986	4.1	39.2	48.7	8.0	4.12	.....	.....	.....	.....	13,090	U. S. G. S.	332
Jefferson.....	Mount Pleasant.....	12	3.1	37.9	49.5	9.52	3.83	5.22	69.56	1.10	10.77	12,880	Ohio.....	9
Do.....	Warren.....	15	3.1	37.9	50.8	8.22	4.02	5.38	71.03	1.26	10.09	13,020	Do.....	9
Do.....	Do.....	1944	4.7	35.6	53.7	6.0	1.54	.....	.....	.....	.....	13,330	U. S. G. S.	290
Do.....	Do.....	15a	4.6	32.4	54.0	9.00	1.55	5.06	71.18	1.32	11.89	12,790	Ohio.....	9
Do.....	Wells.....	16	4.9	33.5	51.5	10.46	4.09	5.03	68.01	1.12	11.29	12,520	Do.....	9
Do.....	Do.....	15563	4.3	38.8	50.0	7.4	3.84	.....	.....	.....	.....	13,150	U. S. G. S.	531
Do.....	Do.....	15564	4.3	37.4	50.3	8.0	3.72	.....	.....	.....	.....	12,960	Do.....	531
Do.....	Smithfield.....	13	5.0	34.5	54.1	6.45	1.75	5.37	72.43	1.33	12.67	13,100	Ohio.....	9
Do.....	Do.....	19	4.2	37.0	50.6	8.22	2.83	5.36	71.20	1.26	11.13	12,890	Do.....	9
Do.....	Do.....	14	4.3	35.3	52.5	7.88	3.01	5.18	71.34	1.20	11.39	12,860	Do.....	9
Do.....	Do.....	1910	4.1	38.5	49.7	7.7	3.67	.....	.....	.....	.....	13,150	U. S. G. S.	290
Do.....	Do.....	15486	4.8	35.9	54.0	5.31	.98	5.35	74.13	1.46	12.77	13,350	Do.....	531
Do.....	Do.....	15487	4.5	36.4	51.0	6.00	3.33	.....	.....	.....	.....	12,880	Do.....	531
Do.....	Do.....	15488	4.3	36.6	52.2	6.9	2.57	.....	.....	.....	.....	13,150	Do.....	531
Do.....	Do.....	15489	4.9	36.6	51.2	7.25	2.00	5.36	71.91	1.38	11.50	12,990	Do.....	531
Do.....	Do.....	15490	5.4	35.8	53.3	5.5	.77	.....	.....	.....	.....	13,180	Do.....	531

Analyses of Ohio coals—Continued.

Pittsburgh coal (No. 8)—Continued.

County.	Township.	Mine or laboratory number.	Proximate.				Ultimate.					British thermal units.	Reference.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.		Organization.	Bull. No.
Jefferson.....	Smithfield.....	15491	5.5	35.7	54.2	4.6	.84	—	—	—	—	13,320	..do.....	531
Do.....	Wayne.....	17	5.0	35.9	51.1	7.95	2.61	5.32	70.68	1.25	12.19	12,870	Ohio.....	9
Harrison.....	Short Creek.....	18	6.5	35.5	51.3	6.74	2.19	5.70	70.49	1.22	13.66	12,710	..do.....	9
Do.....	Athens.....	21	6.0	34.3	53.7	5.97	1.35	5.44	72.22	1.31	13.71	12,960	..do.....	9
Do.....	Cadiz.....	20	3.8	36.7	48.6	10.88	4.38	5.09	67.70	1.27	10.68	12,360	..do.....	9
Do.....	Green.....	15444	5.0	36.2	52.8	6.0	1.74	—	—	—	—	13,190	U. S. G. S.	531
Do.....	do.....	15445	4.3	37.1	49.1	9.5	3.82	—	—	—	—	12,730	..do.....	531

Pomeroy coal (No. 8a).

Gallia.....	Cheshire.....	34	8.2	34.2	46.1	11.46	2.18	5.48	62.95	1.02	16.91	11,500	Ohio.....	9
Meigs.....	Sutton.....	33	4.8	30.3	46.4	12.52	2.94	5.32	65.29	1.17	12.76	11,920	..do.....	9
Do.....	Salisbury.....	29	7.3	34.6	49.4	8.69	2.05	5.53	66.71	1.06	15.96	12,110	..do.....	9
Do.....	do.....	30	7.2	32.8	50.7	9.29	1.32	5.39	66.47	1.10	16.43	12,000	..do.....	9
Do.....	do.....	31	5.5	38.2	45.7	10.58	4.17	5.40	65.55	.95	13.35	11,990	..do.....	9
Do.....	Rutland.....	32	7.6	33.4	48.1	10.93	1.83	5.20	65.29	1.03	15.72	11,720	..do.....	9

Meigs Creek coal (No. 9).

Washington.....	Adams.....	53	2.9	37.5	46.7	12.89	5.55	5.05	65.88	.92	9.71	12,250	Ohio.....	9
Do.....	Aurelius.....	52	3.4	37.9	49.1	9.58	5.03	5.31	68.33	.90	10.85	12,750	..do.....	9
Noble.....	Elk.....	44	3.1	35.4	46.2	12.52	6.00	5.11	66.18	.86	9.52	12,360	..do.....	9
Do.....	Enoch.....	45	2.9	37.2	49.7	10.16	4.27	5.22	68.53	1.04	10.78	12,690	..do.....	9
Do.....	Stock.....	43	2.6	38.4	47.6	11.41	5.79	5.11	67.50	.92	9.27	12,510	..do.....	9
Do.....	Marion.....	42	3.1	37.4	46.7	12.85	5.60	5.09	65.61	.92	9.93	12,150	..do.....	9
Do.....	Brookfield.....	47	3.6	37.4	45.8	13.23	6.21	5.12	64.44	.88	10.12	11,960	..do.....	9
Do.....	do.....	46	4.8	37.3	48.1	9.82	5.59	5.26	66.01	.97	12.35	12,300	..do.....	9
Do.....	Seneca.....	20235	4.5	39.6	45.6	10.52	4.12	5.27	68.00	1.17	11.12	12,320	U. S. G. S.	621
Do.....	do.....	20240	4.6	41.5	44.4	10.53	4.87	5.25	68.15	1.11	10.09	12,510	..do.....	621
Do.....	Beaver.....	20185	4.2	38.4	44.8	12.02	3.61	5.06	64.77	.87	12.67	11,930	Ohio.....	9
Morgan.....	Meigsville.....	50	5.1	36.1	47.1	11.74	4.89	5.09	64.77	.87	12.11	12,200	..do.....	9
Do.....	Bristol.....	48	5.0	37.8	46.8	10.37	4.30	5.14	67.04	.89	12.26	12,110	..do.....	9
Do.....	Manchester.....	49	4.1	37.6	47.6	10.66	5.07	5.10	66.19	.87	12.11	12,200	..do.....	9
Belmont.....	Washington.....	20237	3.5	37.2	41.5	17.8	4.05	—	—	—	—	11,510	U. S. G. S.	621
Do.....	do.....	20176	4.3	39.0	47.1	13.07	3.65	5.31	68.17	1.20	10.46	12,400	..do.....	621
Do.....	Warren.....	37	4.5	35.3	45.5	11.21	3.27	4.99	65.33	1.13	11.71	12,000	Ohio.....	9
Do.....	do.....	40	3.4	35.7	46.0	14.94	3.39	4.86	64.77	1.08	9.96	11,840	..do.....	9
Do.....	Goshen.....	41	3.5	34.8	49.9	11.84	3.67	5.02	67.36	1.05	11.06	12,390	..do.....	9
Do.....	Union.....	39	4.2	35.1	51.1	9.60	3.11	4.97	69.90	1.09	11.33	12,600	..do.....	9
Do.....	do.....	38	4.3	32.5	51.5	11.68	1.94	5.09	68.32	1.11	11.86	12,310	..do.....	9
Do.....	Wheeling.....	36a	7.5	31.8	49.5	11.24	2.11	5.14	66.41	1.11	13.99	11,860	..do.....	9
Do.....	Flushing.....	36	5.0	33.3	48.9	12.52	2.41	4.95	66.31	1.19	12.32	11,970	..do.....	9
Harrison.....	Athens.....	35	5.3	33.1	51.3	10.29	2.20	5.21	68.67	1.25	12.38	12,390	..do.....	9

Uniontown coal.

Monroe.....	Center.....	20259	4.9	35.9	43.9	15.32	3.96	4.87	63.59	1.19	11.07	11,540	U. S. G. S.	621
Belmont.....	Wayne.....	20775	4.7	34.2	45.8	15.34	2.85	4.95	63.71	1.33	11.82	11,660	..do.....	621

Waynesburg coal.

Belmont.....	Somerset.....	20234	4.4	37.1	43.1	15.4	2.90	—	—	—	—	11,660	U. S. G. S.	621
Do.....	do.....	20241	4.5	36.6	44.2	14.75	3.02	5.10	65.32	1.16	10.65	11,800	..do.....	621
Do.....	Washington.....	20236	4.6	36.8	44.2	14.4	2.59	—	—	—	—	11,830	..do.....	621
Do.....	Goshen.....	20174	4.3	35.3	44.2	16.22	3.53	4.98	64.10	1.20	9.97	11,610	..do.....	621

Washington coal.

Belmont.....	Washington.....	20238	4.1	33.7	41.2	21.00	2.86	4.76	59.93	1.09	10.36	10,820	U. S. G. S.	621
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USES OF OHIO COALS.

RANGE OF THE COALS.

The coals of Ohio have nothing like the range in composition possessed by the coals of Pennsylvania and West Virginia. In Pennsylvania the varieties extend from anthracite to gas coals like the Pittsburgh, and in West Virginia

from semibituminous coals like the Pocahontas and New River, with their low content of volatile matter and high percentage of fixed carbon, to the Pittsburgh coal, whose qualities are similar to those of the same coal in Pennsylvania. The Ohio coals, on the other hand, are all bituminous.

COKE.

In former years several Ohio coals have been coked, but not a pound of coke is now made from them in the State, except possibly as a by-product. At Leetonia, Columbiana County, the Lower Kittanning coal was long coked for local use in iron furnaces, but the ovens there have not been fired for years. The coal bed was thin and therefore expensive to work, and the coke, although good, did not equal the standard Connellsville coke. The Middle Kittanning coal was formerly coked in a small way at Hammondsville, Jefferson County, but according to Orton it is too high in ash and sulphur. Moreover, the coal in that locality does not exceed 30 inches in thickness.

The Freeport coals have both been the basis of a small coking industry. The Lower Freeport coal was used for many years for this purpose at Steubenville and yielded a fair coke, but the industry fell into decay, and Pennsylvania coke has taken the place of the product. Slack coal from the Upper Freeport bed was formerly coked at Salineville, but the product was of poor quality. The same bed was once coked at Happy Hollow in western Athens County, but the coal was dirty and high in sulphur, and the coke could not be used where a first-class product was required.

The Pittsburgh coal has been coked on a large scale in Ohio, but the product is not equal to that made in the vicinity of Connellsville, Pa., or along New River, W. Va. The coal is too high in sulphur, but this difficulty might be overcome by washing. A dozen ovens were once in operation in the valley of Wheeling Creek a few miles west of Bridgeport. Slack coal only seems to have been used, but the market for the product was small. Near Utley, in northern Athens County, coke was made from the Pittsburgh coal. About 125 ovens were built, but probably not more than 50 of them were used at any one time, and the last were abandoned nearly 20 years ago. Lathrop, which is a few miles north of Utley, has 50 ovens, but except possibly for a short period in 1907 or 1908 they have not been in use for many years. Slack coal was used at Utley, the lump being thought too expensive. The coke is reported to have found a ready market in several large western cities, but the coal is too high in sulphur to make first-class coke.

RAW COAL FOR FURNACE USE.

The Sharon coal in the natural state is still used at Jackson for making pig iron. The Wellston coal, according to Orton, was formerly used for the same purpose, but it appears to be too high in sulphur and has not been used in iron making for a long time. The Sharon coal in northern Ohio, and especially that of the Mahoning Valley, was once used on a large scale in the blast furnaces of that locality. It was excellent for the purpose, but the bed was thin and the coal, good as it was, did not compare with Connellsville coke for iron making. The Middle Kittanning coal in the Hocking Valley had about 35 years ago a large market in the natural state for use in local blast furnaces. Iron ore was obtained from the same territory, and for a time the industry flourished, but the ores could not compete with those from Michigan, nor was the coal as fuel equal to coke from Pennsylvania, and the industry was short lived.

DOMESTIC USE.

Every coal in Ohio is used for domestic purposes and choice is largely a question of market conditions. The Sharon and Quakertown coals are most prized for this purpose of all the coals of Ohio, and they rank among the best in this country. The Middle Kittanning coal has a large sale for this use. It is among the strongest of the Ohio coals and hence has relatively little slack. It generates a large amount of heat and carries only a moderate percentage of sulphur, but unless the miners are careful shale or clay may be loaded with coal, which thus increases the ash and possibly forms clinker. The Pittsburgh coal also has a large market for domestic use. It is easily ignited, makes a good heat, and is moderate in ash and sulphur, but its tendency to fuse and cut off the draft is objectionable.

GAS MAKING.

Before the advent of natural gas various Ohio coals were used for gas making. Probably the coal from the Middle Kittanning bed had the most extensive market for this purpose, but this may have been due to its having been worked in a larger way than other Ohio coals. The coal is high in volatile matter, but the residue makes a very poor coke,

which of course operates against the bed. Probably the Pittsburgh coal is the best of the large deposits of Ohio for making gas. It is high in volatile matter and makes better coke than any other Ohio coal of a similar quantity. When the natural gas supply in Ohio has failed, as it will in the near future, the better grades of Pittsburgh coal will, in all probability, find a large market for gas making.

STEAM RAISING.

Every coal in Ohio that has workable thickness under existing conditions is used for steam production, and whether one coal or another is used depends largely on the price. However, large purchasers are now taking into consideration the quality of the coal, and especially its heating value, sulphur, and ash. The following figures, taken almost wholly from the records of the Ohio Geological Survey, furnish data on these points:

Quality of Ohio coals.

Coal bed.	Ash.	Sulphur.	B. t. u.
Clarion (17 samples).....	10.8	4.33	11,950
Lower Kittanning (9 samples)...	7.9	3.26	12,580
Middle Kittanning (65 samples).....	7.4	3.30	12,560
Upper Freeport (17 samples)...	9.0	2.54	12,870
Pittsburgh (32 samples).....	9.1	3.81	12,560
Pomeroy (6 samples).....	10.6	2.42	11,870
Meigs Creek (19 samples).....	11.6	4.28	12,240

However, the composition of Ohio coals varies considerably from place to place and in places from mine to mine. Thus the Clarion coal, which is important in only four counties in the southern part of the State, ranges in heat value (rejecting one sample taken from a weathered surface) from 11,130 to 12,530 B. t. u., in sulphur from 2.81 to 6.14, and in ash from 6.2 to 15.3 per cent. This coal is high in both sulphur and ash, and its heat value is not so high as that of most Ohio coals. Nevertheless, it finds a market for steam generation, and this market will doubtless improve as the better coals are worked out. The Lower Kittanning coal is more regular. Its quality is best in the northeastern part of the State, as the table of analyses shows, but unfortunately its quantity is not large.

The great Middle Kittanning bed, noted for its regularity, shows but slight changes from Columbiana County southwestward to Ohio River. Its quality is shown in the following table:

Quality of the Middle Kittanning coal bed from Columbiana County southwestward to Ohio River.

County or field.	Ash.	Sulphur.	B. t. u.
Columbiana, Stark, Carroll, and Holmes (5 samples).....	6.8	2.51	12,900
Tuscarawas (16 samples).....	7.3	3.85	12,800
Coshocton (11 samples).....	6.8	3.82	12,550
Muskingum and northern Perry (10 samples).....	8.4	3.72	12,310
Hocking Valley (8 samples)...	6.2	1.22	12,500
Hocking Valley to Ohio River (8 samples).....	8.2	3.21	12,430

According to the figures given above, this coal has the highest heat value in the northeastern part of the State and decreases to the southwest all the way to Ohio River, except in the Hocking Valley field, where this value is a little higher than in the adjacent areas on the north and south. The figures for the Hocking Valley field also show the lowest percentage of ash and a sulphur percentage less than half that of the next lowest.

The Middle Kittanning coal has long had an extensive market for steam purposes. It is open burning and therefore does not cut off the draft. However, unless the shale partings and pyrite are carefully sorted out, clinkers form, which reduce the draft and may ruin the grate bars. The coal is tough and strong and forms less slack than most Ohio coals. Its heat value is good, and it is moderate in both ash and sulphur.

The Upper Freeport coal shows a greater range in quality than the Middle Kittanning, as indicated below:

Quality of the Upper Freeport coal.

Counties.	Ash.	Sulphur.	B. t. u.
Guernsey and Noble (5 samples)	7.8	3.01	12,720
Muskingum and Coshocton (4 samples).....	7.8	3.80	12,540
Lawrence and Gallia (8 samples).....	10.3	1.62	11,710

The Upper Freeport coal is more distinctly a steam coal than any other in Ohio. In fact, steam making is its one great use. It does not make a good coke, is too high in sulphur for furnace use, and forms too much slack for domestic purposes. The coal from the Cambridge field is one of the best, viewed from the standpoint of heating value, and the sulphur and ash are not excessive.

As stated on the preceding page the Pittsburgh coal forms three distinct fields, and the average quality of the coal in each field is shown below:

Quality of the Pittsburgh coal.

Field.	Ash.	Sulphur.	B. t. u.
Belmont (24 samples).....	8.8	3.71	12,780
Federal Creek (4 samples).....	9.5	4.18	12,060
Swan Creek (4 samples).....	10.5	4.45	11,720

These analyses show that this coal deteriorates toward the southwest. The Pittsburgh coal has a large market for steam making for both locomotives and stationary boilers. It is excellent for this purpose, though its tendency to fuse in burning may reduce the draft.

The Pomeroy coal is high in ash, averaging over 10 per cent, but it is lower in sulphur than the Pittsburgh coal, and has fair heating power. It also is well adapted to the generation of steam.

The Meigs Creek coal, the highest stratigraphically of the important beds in Ohio, ranks well in heating value, but it is high in both sulphur and ash and therefore is not the equal of most other Ohio coals for steam production.

BIBLIOGRAPHY.

- Geological Survey of Ohio:
 Reports of progress for 1869 (1871) and 1870 (1871).
 Volume I (1873), II (1874), III (1878), V (1884), VI (1888), and VII (maps) (1893).
 Bulletins 7 (1905), 9 (1908), 17 (1912), and 20 (1916).
 Geological map of Ohio (1909).
 Ohio Mining Journal, 1883 to 1898.
 Ohio State University Bulletin, volume 18, No. 32 (1914).
 United States Geological Survey:
 Twenty-second Annual Report (1901).
 Bulletins 65 (1881), 290 (1906) and 349 (1908).
 Folios 69 (1900) and 184 (1912).
 Mineral Resources of United States (1882-1915).
 United States Bureau of Mines: Bulletins 22 (1913), 85 (1914), and 119 (1916).

ORIGINAL COAL CONTENT OF THE FIELDS.

By FRANK R. CLARK.

INTRODUCTION.

The coal tonnage of any field is hard to ascertain and may be very differently estimated, even by geologists or engineers using the same set of facts. The estimate herein made is based not on original field work by the author but on a careful study of the facts contained in the reports of the Ohio Geological Survey. The writer's estimate, 87,638,000,000 short tons, is so much higher than any heretofore published that it seems to require an explanation and a careful statement as to its basis and of the manner of its computation.

Three factors have contributed more or less to make the writer's estimate larger than that of others who have essayed to make an inventory of the available coal of Ohio. These factors are (1) the inclusion in the present estimate of the tonnage of coal contained in beds below drainage level, (2) the fixing of a minimum thickness considerably below that which is now considered to be the limit of workability, and (3) the estimation of the original tonnage before mining began rather than that which is still available in the ground. The estimates made by the United States Geological Survey are based on the principle that they should include all coal beds that ever will be mined, regardless of present mining conditions; consequently beds below drainage level, unless they lie at a depth of 5,000 or 6,000 feet, should be considered just as much as those exposed in outcrop, and thin beds should be included as well as thick beds, for sooner or later all will be required to help satisfy the world's demand for fuel. The fixing of a minimum thickness below that which is to-day considered the limit of workability is of course open to question, but the minimum limit fixed, 14 inches, was adopted for all high-rank coal after consideration of thin coal beds mined at present both in this country and abroad. Possibly beds even thinner than 14 inches may be worked when all the thick beds have been exhausted.

The estimate here given was made in 1912 in connection with a computation of the coal resources of the United States and was first published in the "Coal resources of the world" as a part of the proceedings of the Twelfth Interna-

tional Geological Congress at Ottawa, Canada, in 1913. The figures given in that report, 93,967,916,000 short tons, have been somewhat modified on account of new information regarding the absence of coal where it was formerly supposed to be present¹ and by giving tonnage figures in round numbers to the nearest million.

DATA ON WHICH ESTIMATES ARE BASED.

The data used in making the estimate were taken from the Geological Survey of Ohio reports for 1869 and 1870 (two volumes), for 1873 to 1893 (vols. 1 to 7, inclusive), and from Coal Bulletin 9, 1908, Oil and Gas Bulletin 1, 1903, and Bulletin 20 (4th series), 1916. In addition to the data in these reports some information regarding the counties adjoining Ohio on the east was obtained from the reports published by the Geological Survey of Pennsylvania and by that of West Virginia.

Although the Ohio reports are voluminous, much of the material contained in them, especially in the earlier ones, is indefinite, because it does not indicate the exact locations of all the measured coal sections and because the maps do not show the outcrops of all the coal beds. At the time these estimates were made (1912) the only maps available were those (Nos. 1 to 10, inclusive) accompanying volume 7 (Reports for 1873-1893) and two others in Bulletin 9. These maps show the position of the base of the coal measures and the outcrops of the Middle Kittanning, Upper Freeport, Pittsburgh, Pomeroy, and Meigs Creek coal beds. They represent the probable area of the coal beds above drainage level, but they do not show how far below drainage any of the beds may extend.

All data obtained from the various sources named regarding the thickness of the coal beds (every recorded section being used), the regular or irregular habit of any particular bed, and the probable area underlain by each bed were properly tabulated under beds, townships, and counties.

METHODS OF COMPUTATION.

The nature of the data makes it necessary to divide the work of computation into two parts—(1) estimates of beds whose outcrops have been

mapped and (2) estimates of beds whose outcrops have not been mapped and whose areas had to be estimated from the facts recorded in the text. As the Lower Kittanning lies only a short distance below the Middle Kittanning, and the Lower Freeport only a short distance below the Upper Freeport, the outcrops of each group were assumed to be essentially parallel.

All the detailed sections of a particular coal bed were first averaged by townships. Then all these township averages and the sections in adjoining township of other counties were again averaged to obtain the average thickness for the county. The probable area underlain by the coal bed was carefully measured with a planimeter from the maps showing the coal outcrops. The part of the total area lying above drainage level was taken directly from the coal maps, and the part lying below drainage level was estimated on the assumption (in the absence of definite measurements) that a coal bed which is persistent along its outcrop and reasonably constant in thickness will have approximately the same average thickness below drainage level that it has above that level. In the absence of positive evidence that coal is not present it was also assumed that a bed may extend below drainage level toward the center of the main coal basin at right angles to the strike of the beds for a distance equal to that through which it is known to extend above drainage level. Such an assumption, though altogether arbitrary, is at least reasonable and conservative. Concerning it as well as the other assumptions differences of opinion may exist, because they can not be based on hard and fast rules. Obviously, however, there is no good reason for assuming that coal beds lying in relatively undisturbed areas are absent below drainage level simply because their presence has not been proved by mining or drilling. The making of an estimate where the bed lies above drainage level is also attended with difficulties, for here one must also assume that the coal is present or absent, and if the former that it continues at about the average thickness in areas concerning which little or no information is available. The determination of the average thickness of a coal bed as well as its areal extent was greatly facilitated at many points by records of deep borings published in the State reports.

The coal beds which contribute more or less to the total coal of Ohio but which are not

¹ This zone of barren territory or "fault" in the Hocking Valley coal field is shown in Pl. III of this report.

shown in outcrop on any of the maps published before 1912 are the Sharon, Wellston (Quakertown), Lower Mercer, Upper Mercer, Tionesta, Brookville, Clarion, Wilgus, Brush Creek (coals 7a and 7b?), Jeffers, coal No. 10 (wanting in Pennsylvania), Waynesburg (coal No. 11), and Brownsville (coal No. 12). The determination of the probable areas underlain by each of these coal beds was very difficult and unsatisfactory. The areas were obtained with the aid of maps showing the outcrop of the base of the coal measures, the outcrops of the more important coal beds, the location of coal sections, the records of deep borings, and references in the text of the State reports.

The average thickness of each of the coal beds mentioned above in any unit of area (such as the county, township, or less) was obtained by averaging all the sections of coal affecting any one unit area in the same manner as that described for the more important beds.

With the area and thickness of the coal bed determined the next step was to determine the weight. Coal varies somewhat in weight, but the average of most bituminous coals with an ash content of not more than 8 per cent has a

specific gravity of about 1.3. This means that an acre-foot of coal will weigh about 1,800 short tons and that a square-mile-foot will weigh about 1,152,000 short tons. These figures multiplied by the average thickness of the bed expressed in feet gives the tonnage of the coal bed under an acre or a square mile of ground.

THE ESTIMATES.

The following table gives the tonnage by beds and counties. The first column gives the name of the coal bed; the second, the calculated average thickness in feet and inches; the third, the area in square miles considered to contain the coal bed with the average thickness shown in column 2; the fourth, the tons per square mile corresponding to each thickness given in column 2; the fifth, the product in round numbers to the nearest million of the figures in columns 3 and 4; and the sixth, the sum of all figures in column 5. This table contains the tonnage of 20 coal beds which contribute more or less to the fuel supply of the State, and one or more of the beds is considered to be present in 31 counties in eastern Ohio.

Estimated coal tonnage by beds and counties.

Athens County.

Name of coal bed.	Average thickness.	Area (sq. mi.).	Tons per square mile.	Tonnage by beds (in round numbers).	Tonnage for all beds (in round numbers).
	<i>Ft. in.</i>				
Pomeroy.....	2 5	25	2,784,000	70,000,000	6,218,000,000
Pittsburgh.....	4 2	115	4,800,000	552,000,000	
Upper Freeport.....	4 0	330	4,608,000	1,521,000,000	
Lower Freeport.....	2 10	130	3,264,000	424,000,000	
Middle Kittanning.....	5 5	430	6,240,000	2,683,000,000	
Lower Kittanning.....	2 0	420	2,304,000	968,000,000	

Belmont County.

Waynesburg and Brownsville.....	1 8	60	1,920,000	115,000,000	7,984,000,000
Coal No. 10.....	3 4	130	3,840,000	499,000,000	
Meigs Creek.....	3 9	385	4,320,000	1,663,000,000	
Pittsburgh.....	4 11	475	5,664,000	2,690,000,000	
Upper Freeport.....	3 8	515	4,224,000	2,175,000,000	
Lower Freeport.....	3 3	225	3,744,000	842,000,000	

*Estimated coal tonnage by beds and counties—Continued.***Carroll County.**

Name of coal bed.	Average thickness.	Area (sq. mi.).	Tons per square mile.	Tonnage by beds (in round numbers).	Tonnage for all beds (in round numbers).
	<i>Ft. in.</i>				
Brush Creek ("Harlem" coal No. 7b).....	1 5	15	1,632,000	24,000,000	5,193,000,000
Upper Freeport.....	3 8	260	4,224,000	1,098,000,000	
Lower Freeport.....	3 1	250	3,552,000	888,000,000	
Middle Kittanning.....	4 0	370	4,608,000	1,705,000,000	
Lower Kittanning.....	2 9	370	3,168,000	1,172,000,000	
Brookville.....	2 5	110	2,784,000	306,000,000	

Columbiana County.

Brush Creek.....	2 11	200	3,360,000	672,000,000	5,871,000,000
Upper Freeport.....	4 4	245	4,992,000	1,223,000,000	
Lower Freeport.....	2 3	175	2,592,000	454,000,000	
Middle Kittanning.....	2 6	430	2,880,000	1,238,000,000	
Lower Kittanning.....	2 3	500	2,592,000	1,296,000,000	
Clarion.....	3 3	120	3,744,000	449,000,000	
Lower Mercer.....	2 4	175	2,688,000	470,000,000	
Sharon.....	2 0	30	2,304,000	69,000,000	

Coshocton County.

Upper Freeport.....	3 0	5	3,456,000	17,000,000	2,130,000,000
Middle Kittanning.....	3 4	195	3,840,000	749,000,000	
Lower Kittanning.....	3 2	195	3,648,000	711,000,000	
Brookville.....	2 3	190	2,592,000	492,000,000	
Upper Mercer.....	6 8	2	7,680,000	15,000,000	
Lower Mercer.....	1 10	20	2,112,000	42,000,000	
Sharon.....	2 0	35	2,304,000	81,000,000	
Sharon.....	2 0	10	2,304,000	23,000,000	

Gallia County.

Pomeroy.....	2 5	90	2,784,000	251,000,000	3,791,000,000
Pittsburgh.....	3 5	40	3,956,000	158,000,000	
Jeffers (local name for Pittsburgh).....	3 7	90	4,128,000	372,000,000	
Upper Freeport.....	4 3	45	4,896,000	220,000,000	
Lower Freeport.....	2 1	30	2,400,000	72,000,000	
Middle Kittanning.....	3 1	425	3,552,000	1,600,000,000	
Lower Kittanning.....	2 4	300	2,688,000	806,000,000	
Clarion.....	2 1	130	2,400,000	312,000,000	

Guernsey County.

Pittsburgh.....	3 8	20	4,224,000	84,000,000	4,687,000,000
Brush Creek.....	2 0	300	2,304,000	691,000,000	
Upper Freeport.....	2 5	370	2,784,000	1,030,000,000	
Lower Freeport.....	5 10	40	6,720,000	269,000,000	
Middle Kittanning.....	1 11	30	2,208,000	66,000,000	
Lower Kittanning.....	2 11	360	3,360,000	1,210,000,000	
Brookville.....	2 9	360	3,168,000	1,140,000,000	
Lower Mercer.....	2 5	35	2,784,000	97,000,000	
Lower Mercer.....	2 2	40	2,496,000	100,000,000	

*Estimated coal tonnage by beds and counties—Continued.***Harrison County.**

Name of coal bed.	Average thickness.	Area (sq. mi.).	Tons per square mile.	Tonnage by beds (in round numbers).	Tonnage for all beds (in round numbers).
	<i>Ft.</i>	<i>in.</i>			
Coal No. 10.....	1	10	30	2,112,000	5,615,000,000
Meigs Creek.....	4	2	30	4,800,000	
Pittsburgh.....	4	11	110	5,664,000	
Brush Creek.....	2	5	70	2,784,000	
Upper Freeport.....	3	4	295	3,840,000	
Lower Freeport.....	3	0	265	3,456,000	
Middle Kittanning.....	4	0	315	4,608,000	
Lower Kittanning.....	3	0	315	3,456,000	

Hocking County.

Upper Freeport.....	3	6	10	4,032,000	813,000,000
Lower Freeport.....	3	4	10	3,840,000	
Middle Kittanning.....	6	3	40	7,200,000	
Lower Kittanning.....	2	3	45	2,592,000	
Clarion.....	2	6	5	2,880,000	
Brookville.....	2	0	10	2,304,000	
Tionesta.....	2	9	50	3,168,000	
Upper Mercer.....	1	4	20	1,536,000	
Lower Mercer.....	2	0	45	2,304,000	

Holmes County.

Middle Kittanning.....	3	4	30	3,840,000	940,000,000
Lower Kittanning.....	2	11	30	3,360,000	
Brookville.....	2	0	20	2,304,000	
Tionesta.....	2	6	5	2,880,000	
Upper Mercer.....	3	2	40	3,648,000	
Lower Mercer.....	3	0	80	3,456,000	
Quakertown.....	2	0	55	2,304,000	
Sharon.....	2	0	50	2,304,000	

Jackson County.

Upper Freeport.....	5	2	1	5,952,000	1,123,000,000
Middle Kittanning.....	2	0	40	2,304,000	
Lower Kittanning.....	2	11	50	3,360,000	
Clarion.....	3	7	80	4,128,000	
Brookville.....	2	0	5	2,304,000	
Tionesta.....	2	0	5	2,304,000	
Upper Mercer.....	1	4	10	1,536,000	
Quakertown.....	2	8	120	3,072,000	
Sharon.....	2	7	40	2,976,000	

Jefferson County.

Coal No. 10.....	1	6	20	1,728,000	5,986,000,000
Pittsburgh.....	4	11	110	5,664,000	
Brush Creek.....	3	2	155	3,648,000	
Upper Freeport.....	3	5	130	3,936,000	
Lower Freeport.....	4	0	380	4,608,000	
Middle Kittanning.....	2	8	395	3,072,000	
Lower Kittanning.....	2	6	395	2,880,000	
Lower Mercer.....	2	7	50	2,976,000	

THE COAL FIELDS OF OHIO.

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Estimated coal tonnage by beds and counties—Continued.

Lawrence County.

Name of coal bed. *	Average thickness.	Area (sq. mi.).	Tons per square mile.	Tonnage by beds (in round numbers).	Tonnage for all beds (in round numbers)
	<i>Ft. in.</i>				
Pomeroy.....	2 5	40	2,784,000	111,000,000	2,393,000,000
Jeffers (local name for Pittsburgh).....	1 3	20	1,440,000	29,000,000	
Wilgus.....	2 0	75	2,034,000	173,000,000	
Upper Freeport.....	3 3	135	3,744,000	505,000,000	
Lower Freeport.....	2 9	40	3,168,000	127,000,000	
Middle Kittanning.....	2 8	100	3,072,000	307,000,000	
Lower Kittanning.....	2 7	200	2,976,000	595,000,000	
Clarion.....	3 1	50	3,552,000	178,000,000	
Tionesta.....	1 8	60	1,920,000	115,000,000	
Upper Mercer.....	1 10	120	2,112,000	253,000,000	

Licking County.

Lower Mercer.....	2 4	5	2,688,000	13,000,000	48,000,000
Sharon.....	2 0	15	2,304,000	35,000,000	

Mahoning County.

Middle Kittanning.....	2 6	70	2,880,000	202,000,000	1,479,000,000
Lower Kittanning.....	2 4	70	2,688,000	188,000,000	
Clarion.....	3 4	50	3,840,000	192,000,000	
Upper Mercer.....	2 4	175	2,688,000	470,000,000	
Lower Mercer.....	2 7	50	2,976,000	149,000,000	
Sharon.....	2 5	100	2,784,000	278,000,000	

Medina County.

Sharon.....	3 2	20	3,648,000	73,000,000	73,000,000
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Meigs County.

Pomeroy.....	2 5	100	2,784,000	278,000,000	1,748,000,000
Pittsburgh.....	3 4	45	3,840,000	173,000,000	
Lower Freeport.....	2 2	30	2,496,000	75,000,000	
Middle Kittanning.....	3 9	155	4,320,000	670,000,000	
Lower Kittanning.....	2 3	155	2,592,000	402,000,000	
Clarion.....	3 3	40	3,744,000	150,000,000	

Monroe County.

Meigs Creek.....	3 9	155	4,320,000	670,000,000	2,913,000,000
Pittsburgh.....	4 0	320	4,608,000	1,475,000,000	
Upper Freeport.....	3 5	195	3,936,000	768,000,000	

Morgan County.

Meigs Creek.....	3 8	85	4,224,000	359,000,000	6,669,000,000
Pittsburgh.....	4 4	20	4,992,000	100,000,000	
Upper Freeport.....	3 10	395	4,416,000	1,744,000,000	
Lower Freeport.....	2 3	320	2,592,000	829,000,000	
Middle Kittanning.....	5 5	400	6,240,000	2,496,000,000	
Lower Kittanning.....	2 5	410	2,784,000	1,141,000,000	

*Estimated coal tonnage by beds and counties—Continued.***Muskingum County.**

Name of coal bed.	Average thickness.	Area (sq. mi.).	Tons per square mile.	Tonnage by beds (in round numbers).	Tonnage for all beds (in round numbers).
	<i>Ft.</i> <i>in.</i>				
Pittsburgh.....	2 6	10	2,880,000	29,000,000	4,836,000,000
"Norwich" (coal No. 7b).....	2 2	10	2,496,000	25,000,000	
"New Concord" (coal No. 7a).....	2 0	30	2,304,000	69,000,000	
Upper Freeport.....	4 1	300	4,704,000	1,411,000,000	
Lower Freeport.....	2 1	75	2,400,000	180,000,000	
Middle Kittanning.....	3 5	415	3,936,000	1,633,000,000	
Lower Kittanning.....	2 11	415	3,360,000	1,394,000,000	
Brookville.....	2 0	15	2,304,000	35,000,000	
Lower Mercer.....	2 0	15	2,304,000	35,000,000	
Quakertown (Wellston).....	2 0	5	2,304,000	12,000,000	
Sharon.....	2 3	5	2,592,000	13,000,000	

Noble County.

Meigs Creek.....	4 4	155	4,992,000	774,000,000	2,926,000,000
Pittsburgh.....	3 9	5	4,320,000	22,000,000	
Upper Freeport.....	4 3	405	4,896,000	1,983,000,000	
Middle Kittanning.....	2 3	30	2,592,000	78,000,000	
Lower Kittanning.....	2 0	30	2,304,000	69,000,000	

Perry County.

Upper Freeport.....	4 10	60	5,568,000	334,000,000	2,141,000,000
Lower Freeport.....	3 11	60	4,512,000	271,000,000	
Middle Kittanning.....	6 1	120	7,008,000	841,000,000	
Lower Kittanning.....	2 9	145	3,168,000	459,000,000	
Clarion.....	1 5	80	1,632,000	131,000,000	
Tionesta.....	2 0	30	2,304,000	69,000,000	
Upper Mercer.....	1 7	20	1,824,000	36,000,000	

Portage County.

Brookville.....	4 6	10	5,184,000	52,000,000	150,000,000
Lower Mercer.....	2 0	10	2,304,000	23,000,000	
Sharon.....	2 2	30	2,496,000	75,000,000	

Scioto County.

Clarion.....	3 7	10	4,128,000	41,000,000	131,000,000
Tionesta.....	1 9	20	2,016,000	60,000,000	
Upper Mercer.....	1 9	15	2,016,000	30,000,000	

Stark County.

Upper Freeport.....	2 9	5	3,168,000	16,000,000	1,873,000,000
Middle Kittanning.....	3 3	100	3,744,000	374,000,000	
Lower Kittanning.....	3 3	100	3,744,000	374,000,000	
Brookville.....	2 7	150	2,976,000	446,000,000	
Lower Mercer.....	2 2	50	2,496,000	125,000,000	
Quakertown.....	2 0	20	2,304,000	46,000,000	
Sharon.....	3 2	135	3,648,000	492,000,000	

Summit County.

Quakertown.....	2 6	30	2,880,000	86,000,000	542,000,000
Sharon.....	3 2	125	3,648,000	456,000,000	

Estimated coal tonnage by beds and counties—Continued.

Trumbull County.					
Name of coal bed.	Average thickness.	Area (sq. mi.).	Tons per square mile.	Tonnage by beds (in round numbers).	Tonnage for all beds (in round numbers).
Sharon.....	<i>Ft. in.</i> 2 0	10	2, 304, 000	23, 000, 000	23, 000, 000
Tuscarawas County.					
Upper Freeport.....	2 3	85	2, 592, 000	220, 000, 000	3, 135, 000, 000
Middle Kittanning.....	3 9	325	4, 320, 000	1, 404, 000, 000	
Lower Kittanning.....	2 11	325	3, 360, 000	1, 092, 000, 000	
Brookville.....	3 0	45	3, 456, 000	156, 000, 000	
Tionesta.....	2 5	65	2, 784, 000	181, 000, 000	
Upper Mercer.....	2 3	25	2, 592, 000	65, 000, 000	
	3 0	5	3, 456, 000	17, 000, 000	
Vinton County.					
Upper Freeport.....	3 0	20	3, 456, 000	69, 000, 000	2, 584, 000, 000
Lower Freeport.....	3 4	10	3, 840, 000	38, 000, 000	
Middle Kittanning.....	3 6	115	4, 032, 000	464, 000, 000	
Lower Kittanning.....	1 11	115	2, 208, 000	254, 000, 000	
Clarion.....	3 3	110	3, 744, 000	412, 000, 000	
Brookville.....	3 4	90	3, 840, 000	346, 000, 000	
Tionesta.....	2 6	15	2, 880, 000	43, 000, 000	
Upper Mercer.....	2 11	75	3, 360, 000	252, 000, 000	
Lower Mercer.....	2 11	130	3, 360, 000	437, 000, 000	
Quakertown (Wellston).....	2 9	85	3, 168, 000	269, 000, 000	
Washington County.					
Meigs Creek.....	4 0	100	4, 608, 000	461, 000, 000	3, 345, 000, 000
Pittsburgh.....	2 5	120	2, 784, 000	334, 000, 000	
Upper Freeport.....	3 2	120	3, 648, 000	438, 000, 000	
Middle Kittanning.....	4 2	440	4, 800, 000	2, 112, 000, 000	
Wayne County.					
Lower Mercer.....	2 4	30	2, 880, 000	86, 000, 000	301, 000, 000
Sharon.....	4 8	40	5, 376, 000	215, 000, 000	

Total original tonnage in round numbers of all beds in all counties.....	Short tons. 87, 638, 000, 000
Total coal mined in Ohio to end of 1915.....	723, 956, 352
Wasted in mining or rendered useless, estimated, in round numbers.....	362, 000, 000
Amount remaining and available, in round numbers.....	86, 552, 000, 000

The principal part of the tonnage, according to this estimate, is contained in seven coal beds, the outcrops of which are shown on the coal maps described above. These beds, in the order of their tonnage, are as follows: Middle Kittanning, 22,926,000,000 tons; Upper Freeport, 16,732,000,000 tons; Lower Kittanning, 14,674,000,000 tons; Lower Freeport, 6,971,000,000 tons; Pittsburgh, 6,863,000,000 tons; Meigs Creek, 4,071,000,000 tons; and Pomeroy, 710,000,000 tons. The total for these beds is 72,947,000,000 tons, or more than 83

per cent of the total tonnage of the State. The first three beds contain 54,332,000,000 tons, or more than 61 per cent of the total coal of the State.

From this showing it is evident that the total tonnage of those coal beds for which there are no outcrop maps is relatively small (only about 17 per cent of the entire estimate), and even if some errors have been made in estimating their areas and average thicknesses such errors will not greatly affect the total tonnage. Furthermore, the Anthony, Bear Run, "Lost

Seam," Mahoning, Mason, and Vandusen coal beds, which are thin local beds in the southern counties that are not included in the figures, will tend to offset an overestimate of other beds.

Recent detailed work done in southern Ohio by the State Survey¹ materially affects the estimate for that area made in 1912. The recent investigations tend to reduce the total tonnage, although for a few beds the area and thickness were increased.

In the earlier reports certain beds were said to be persistent and of good thickness throughout large areas, whereas recent detailed work in the southern counties shows that these beds vary in thickness and are restricted to small areas. Therefore, if the earlier reports contain the same kind of error regarding the coal in other parts of the State, the present estimate may be too large, but any further reduction is unwarranted until further detailed work is completed.

¹ Ohio Geol. Survey Bull. 20, 1916.

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